

# Apple Service Technical Procedures Apple II/Apple III Archived Products

**Volume Two** 

PN: 072-0231

# **★** Apple Technical Procedures

# Apple II/Apple III Archived Products Volume Two

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## SILENTYPE PRINTER TECHNICAL PROCEDURES

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## Silentype Technical Procedures

## Section 1

## Take-Apart

## Contents:

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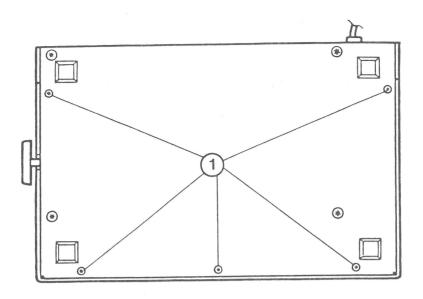


FIGURE 1

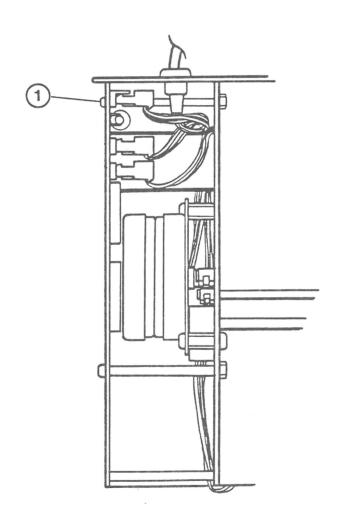


FIGURE 2

## A. REMOVING THE COVER AND BASE

## Removing the Cover

- 1. Turn the Apple off.
- 2. Disconnect the printer from the interface card.
- 3. Tip the unit up on its back.

NOTE: Do not turn the Silentype completely over. The paper roll is held in by gravity.

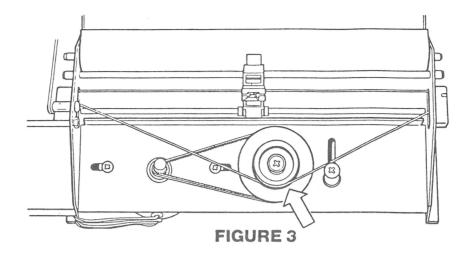
- 4. Using a Torx screwdriver, remove the five screws around the outside of the base which hold the plastic cover on (see Figure 1).
- 5. Remove the cover.

## Removing the Base

6. While holding the chassis to the base, remove the remaining four screws.

NOTE: In general, it is a good idea to remove all nine screws every time you begin to service a Silentype, since you will nearly always have to get underneath the assembly.

7. Tip the unit back down. At the left of the unit is a printed circuit board (the deserializer card). Locate the three cables connected to it, and disconnect the rearmost cable (interface cable) from connector J3 (see Figure 2, #1). The chassis can now be lifted from the base.



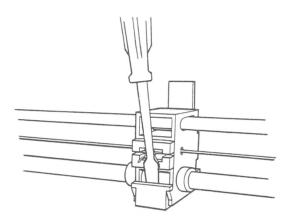
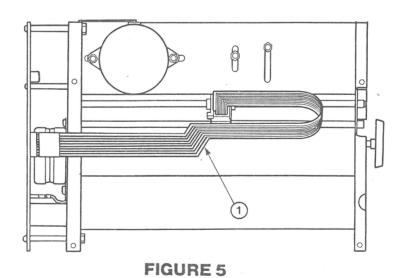


FIGURE 4



#### REPLACING THE HEAD CABLE B.

## Removing the Cable

- Remove the Silentype cover and base (see section A, p. 1.3).
- Rotate the pulley (Figure 3) until the print head is in the center of the platen.
- Using a small screwdriver, pry the cable clip away from the head carrier, forward and down (Figure 4). The cable will fall away from the head assembly.
- Tip the chassis up so the underside faces you. 4.
- If the head cable is taped to the chassis, untape it. 5.
- Unplug the cable from the deserializer card.
- Pull the cable clip off the other end of the cable. (Don't worry, it does come off.)

## Installing the Cable

Hold the new cable up so the change of direction goes upward (Figure 5, #1), and carefully plug it to the deserializer card.

IMPORTANT: THE HEAD CABLE IS EASILY DAMAGED. PERFORM THE NEXT STEPS CAREFULLY AND GENTLY. particular, make sure the cable is fully inserted into the cable clip before connecting the clip to the print head assembly; otherwise you may crimp and crack it.

- Plug the other end to the cable clip, making sure the small rubber pad is in place between the cable connections and the clip.
- 10. Bend the cable without twisting, and clip it to the print head assembly (Figure 5).
- 11. Make certain the cable crosses the left side of the chassis at a right angle, and secure it to the left rail with cellophane tape.

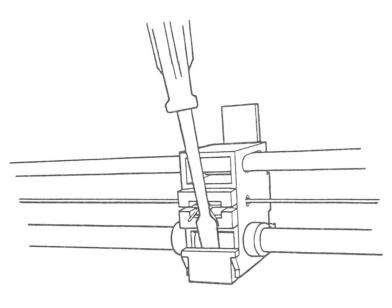


FIGURE 6

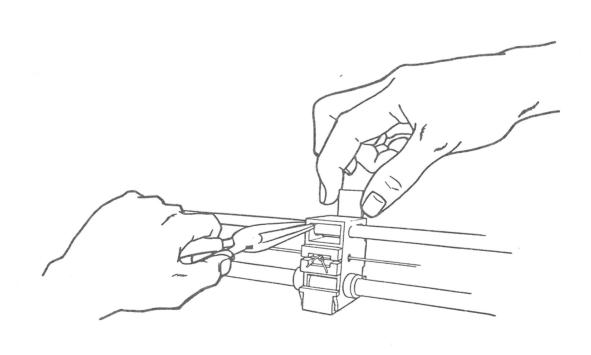


FIGURE 7

#### C. REPLACING THE PRINT HEAD

## Removing the Print Head

- Remove the Silentype cover and base (see section A, p. 1.3)
- Pry the cable clip off the print head carrier, 2. forward and down (Fig. 6). The cable will fall away from the head assembly.
- Using needlenose pliers, gently pull the head carrier toward the front of the printer (see Figure 7).

CAUTION: THE CERAMIC HEAD IS BRITTLE. THAT MEANS IT CAN SHATTER. IT ALSO CAN BE SHARP ENOUGH TO CUT FINGERS. USE CARE WITH THE NEXT OPERATION!

With your fingers, pull the head upward -- carefully -- sliding it out of the head carrier (see Figure 7). If you can't pull the head out with your fingers, stand the chassis on end and carefully push the head out of the carrier with a screwdriver.

## INSTALLING THE PRINT HEAD

NOTE: The plastic bar that supports the paper is called the platen. It should not be necessary to remove it, but it sometimes falls out, and it is important to replace it SQUARE EDGE UP. Otherwise the print head will short out and ruin the Silentype.

- Make sure the platen is properly seated and gently pushed back, then slide the new head in with the edge connector on the bottom and the white side facing you.
- Push the head gently down until it is seated against the plastic stop. If it becomes caught, tilt the chassis up (to see what the problem is) and help it Be careful not to shear off the plastic stop at the bottom of the head carrier.

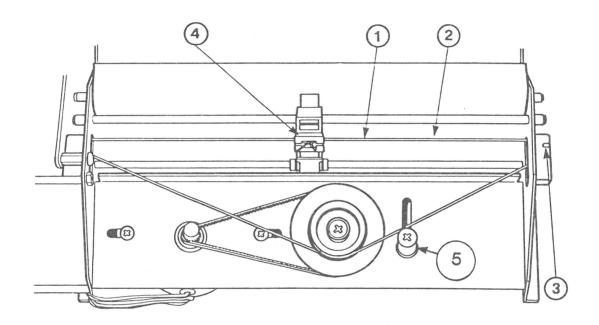


FIGURE 8

## D. REPLACING THE DRIVE STRING

- 1. Remove the Silentype cover and base (see section A, p. 1.3).
- 2. Turn the pulley until the print head is in the middle of the platen.
- 3. Hold the pulley from beneath with a pair of pliers, and with a screwdriver, loosen the screw.
- 4. Push the pulley toward the printer, taking the tension off the string; then, with the pulley pushed toward the printer, tighten it back down.
  - IMPORTANT: If the pulley is too close to the printer, it will bind. Make sure it can turn freely when you tighten it down.
- 5. Hold the idler (Figure 8, #5) from beneath with a pair of pliers, and with a screwdriver, loosen the screw and move the idler towards you. The idler screw can be left loose for right now.
- 6. Unwind the string from the pulley.
- 7. Cut the old string on the right side of the print head (Figure 8, #1).
- 8. Tie a new string (precut to approximately 40") to the right hand portion of the old string (Figure 8, #2).
- 9. Pull on the old string on the left side of the print head, until the new string is threaded through the right guide (Figure 8, #3), across the front, and through the left guide.
- 10. Cut the knot out completely.
- 11. Pry the retainer (Figure 8, #4) out of the head assembly, and discard the old string.
- 12. Thread the new string into the small holes from the outside of both sides of the head assembly, and tie a loose knot.
- 13. Pull the knot straight back until the string is taut.
- 14. Pull the front part of the string toward you about 14 inches; then take the portion of string coming out of the left guide and, starting at the bottom front of the pulley, wrap six turns counterclockwise around the pulley.

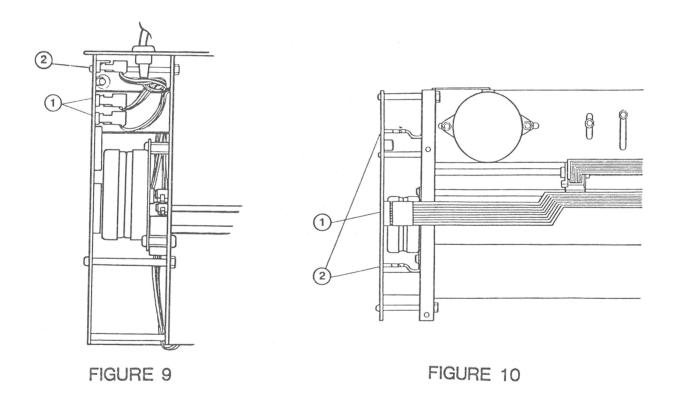
IMPORTANT: Make sure the loops of string do not overlap; if they do, you will have alignment problems.

15. Grasp the knot and pull until the string is snug.

- 16. Slip the retainer in place in the print head assembly.
- 17. Holding the string snug, cut out the old square knot and start a new one.

NOTE: Make sure the string runs between the idler and the paper.

18. Tighten it, finish the square knot, and cut away the excess string.



## E. REPLACING THE DESERIALIZER CARD

## Removing the Card

- 1. Remove the Silentype cover and base (see section A).
- 2. Locate the two motor plugs (Figure 9, #1). Put a piece of tape on the frontmost plug, to identity it.
- 3. Remove the two motor plugs.
- 4. Turn the chassis up and disconnect the print head cable (Figure 10, #1).
- 5. Disconnect the left margin switch connector (Figure 10, #2).

NOTE: On the EMI version of Silentype, the left margin switch consists of two wires, as shown in Figure 10. Earlier Silentypes have only one wire (the rear one).

6. Remove the three screws holding the deserializer card to the chassis.

IMPORTANT: BEFORE REPLACING THE DESERIALIZER CARD, MAKE SURE THAT THE NEW CARD IS EMI-COMPATIBLE WITH THE CHASSIS. SEE SECTION 5, SILENTYPE MODIFICATIONS.

## Installing the Card

- 7. Put the card into position, taking care not to capture any wires behind the capacitor, and thread the bottom screw through the spacer and nut until it is "finger-tight".
- 8. Put in the other two screws. After checking to make sure no wires are caught beneath the spacers, tighten the three screws.
- 9. If you're working on a non-EMI Silentype, make sure that the bottom screw is tight enough to make good electrical contact. (It is part of the electrical continuity that forms the ground.)
- 10. Connect the left margin switch wire(s) and the print head cable.
- 11. Tip the chassis back down. Plug in the motor plugs (on each, the orange wire connects to the top pin) and the interface cable (Figure 10, #1 and 2). Remove the tape from the frontmost plug.
- 12. Reinstall the base and cover. Make sure all screws are tight.

**NOTE:** Do not apply power while the printer assembly is loose in the base; it may cause a short circuit between the base and the deserializer card.

# Silentype Technical Procedures

## Section 2

## Alignment Procedures

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## A. Silentype Alignment Procedures

Whenever you change the string on a Silentype, or when a customer complains that the print margins are misaligned, perform the following procedures.

- Using a known-good Apple II system, make sure the power is off, then plug the Silentype interface card into Slot 1 on the motherboard. Make sure the card is properly seated, and then turn the power on.
- 2. Place the Apple II Product Diagnostics diskette (P/N 652-0334) in drive 1. Boot the diagnostic and select CARD TESTS from the main menu; then select SILENTYPE TEST from the secondary menu.
- 3. Accept "Align print head" when that option comes up on the screen. The program will cause the Silentype to print rows of capital H's until you stop it by pressing Y. The rows of H's will allow you to see if there is any misalignment. If there is serious misalignment (more than one dot to the left or right), continue with these procedures.
- 4. Check the drive string where it winds around the pulley. If the loops of string are uneven, overlapping each other, the string tension will be uneven and that will cause misalignment. If necessary, loosen the pulley and re-wrap the string around it so that the loops of string do not overlap.
- 5. Check the tension on the drive string. It should be just tight enough so that it does not slip on the pulley. To adjust it coarsely, loosen the pulley screw and move the pulley to the desired position; then tighten the screw.
- 6. Check the tension on the motor belt (between the motor and the pulley): it should be just tight enough to prevent slipping. Overtightening causes the print head to move unevenly, which makes alignment difficult. (It also causes wear on the bearings.) If necessary, loosen the two motor mounting screws very slightly (the adjustment is easiest if they are slightly tight) and move the motor. Start with a snug but not stretched belt. Print a pair of lines and notice any misalignment. Move the motor slightly to the right and observe the printing of a pair of lines. Repeat until alignment is as good as you can make it; then tighten the motor screws.
- 7. While the "H's" are printing, change the position of the idler roller by loosening the idler screw and moving the idler. This fine-tunes the tension on the string. When alignment is as good as you can make it, tighten the idler screw.

## Silentype Technical Procedures

## Section 3

## Diagnostics

## Contents:

Alignin	ng the	Silentype	Printer	Mechanism	• • • • • • • • •	.3.3
Other I	ests.					.3.4

## INTRODUCTION

This diagnostic is found on the Apple II Products Diagnostics diskette (Part Number 686--0005) under the main menu selection of CARD TESTS.

## ALIGNING THE SILENTYPE PRINTER MECHANISM

- This test would be run whenever the print quality of the Silentype is poor or the print head does not move smoothly from one margin to the other.
- 2. To run the test:
  - Install the Silentype Interface card in slot 1 a. and connect the Silentype to it.
  - Boot the Apple II Product Diagnostics diskette. b.
  - С. Use the <ESC> key to move the cursor to the CARD TESTS line on the main menu, then press <RETURN>.
  - d. Use the <ESC> key to move the cursor to the SILENTYPE TEST line on the card test menu, then press <RETURN>.
  - Type in "Y" and then press <RETURN> to the е. prompt:
    - DO YOU WISH TO ALIGN THE PRINT HEAD DRIVE MECHANICS AT THIS TIME?
  - The Silentype will start printing H's from the left to right margin then reverse direction and print H's from the right to the left margin.
    - You can suspend the printing at any time by pressing "Y" to the prompt:
      - DO YOU WISH TO SUSPEND PRINTING?
    - (2) You can then exit the test by pressing "N" to the prompt:
      - DO YOU WISH TO RESUME PRINTING PATTERN?
      - If you answer yes by pressing "Y", the test will resume printing H's.
  - Observe the quality of the printed characters on the paper for:
    - (1) Bidirectional Printing
      - If the left and right margins are not even, adjust the Dacron Cord.

- That the Print Head moves evenly from one (2)margin to the other.
  - If the Print Head movement is uneven, adjust the Drive Motor belt tension.
- For all other print quality problems, refer to the Silentype Troubleshooting - Section 4 -

#### OTHER TESTS В.

The remaining tests on the Apple II Product Diagnostics are for testing the carriage and paper drives, printing and variable intensity circuits, and bi-directional print function.

## To run the tests:

- Install the Silentype Interface card in slot 1 and connect the Silentype to it.
- Boot the Apple II Product Diagnostics diskette. b.
- Use the <ESC> key to move the cursor to the CARD TESTS line on the main menu, then press <RETURN>.
- Use the <ESC> key to move the cursor to the SILENTYPE TEST line on the card test menu, then press <RETURN>.
- Type in "N" and then press <RETURN> to the prompt:

DO YOU WISH TO ALIGN THE PRINT HEAD DRIVE MECHANICS AT THIS TIME?

#### 3. Firmware Test

The Firmware test will check the ROMs on the Silentype Interface Card and report their condition to you.

#### RAM Test 4 .

The RAM test will check the RAM on the Silentype Interface Card and report their condition to you.

#### Margin Switch 5.

This test will check the status of the left margin switch and report to you its condition.

## 6. Head Movement

This test will make the print head move back and forth. Observe that the Print Head moves smoothly in both directions.

## 7. Line Feed

This test will send a line feed character to the Silentype. Observe that the paper exits squarely and that there are no wrinkles or creases caused by the paper feed mechanism.

## 8. Print Head Dot Integrity

This test will print a series of lines on the printer paper, each one representing one of the seven dots on the Print Head. Below is an example from a good Silentype Printer:



## 9. Print Intensity Control Test

This test prints out 6 lines on the printer paper which vary in eight degrees of intensity. Below is an example from a good Silentype Printer:



## 10. Bidirectional Print Registration

This test prints parallel vertical lines to verify the Bidirectional Print Adjustment. The tolerance is +/- one dot.



## Silentype Technical Procedures

## Section 4

## Troubleshooting

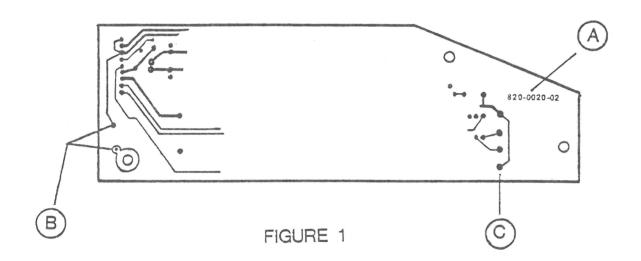
NOTE: The Silentype printer should be tested with the Apple II Peripherals Diskette. (See Multi-Product Diagnostics Technical Procedures, Section 1.)

## Silentype Troubleshooting Chart Probable Cause Some dots are not 1) Head Cable 2) Print Head printing. 3) Deserializer Card One or more dots print 1) Deserializer Card continuously. 1) Deserializer Card Silentype prints wrong characters. \_\_\_\_\_ No print head movement or 1) Belt Tension Adjustment movement is erratic. Print intensity test fails. 1) Deserializer Card Silentype will not print 1) Cord Tension Adjustment bidirectionally. Silentype prints unreadable 1) Print Head or no characters; print head 2) Platen Assembly 3) Deserializer Card Paper does not advance 1) Paper Bearing Assembly 2) Deserializer Card properly. 3) Paper drive motor

NOTE: If the troubleshooting actions listed above do not repair the problem, send the Silentype unit back to Apple for repair.

# Silentype Technical Procedures Section 5 Modifications

Con	tents:					
EMI	Modifications	to	the	Silentype	 5.	( ' )



## EMI MODIFICATIONS TO THE SILENTYPE

Like the Apple II, the Silentype has been modified to reduce the electromagnetic (radio frequency) interference produced by early models. The new versions are called EMI (or RFI) Silentypes.

Only the EMI chassis and deserializer card are now produced and available from Apple, but there are plenty of early-model Silentypes in the field. If you have to swap out the deserializer card on an old, non-EMI Silentype, you will have to replace it with an EMI card; but unless you modify it, the new card will cause the old chassis to print with an uneven left margin. Therefore you need to know how to identify the two types of chassis and deserializer card, and how to modify the EMI card to work with a non-EMI chassis.

## IDENTIFICATION

## The Chassis

The EMI Silentype chassis has a two-wire left margin switch connector where the earlier Silentype has a single-wire connector. They are also distinguishable by model number: the earlier version has model number A2M0032, the EMI version has model number A2M0036. The model number is printed on the label on the back of the case.

To summarize:

Non-EMI

EMI

Model # A2M0032 One-wire left margin switch

Model # A2M0036 Two-wire left margin switch

## The Deserializer Card

The EMI card has part number 820-0020-02 printed on the trace side (see Figure 1, A). It has an additional terminal pin (J6) (Figure 1, C) for the extra EMI left margin wire switch.

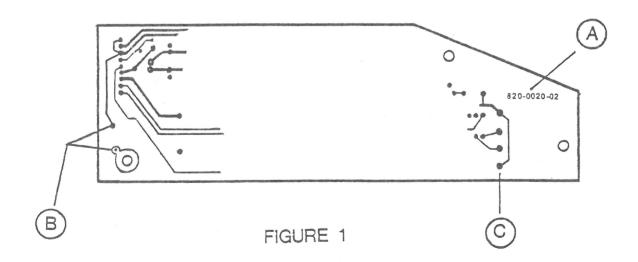
The non-EMI card bears part number 820-0020-01. It has a single terminal pin (labelled J5) for the left margin switch wire.

More information on the differences between the EMI and non-EMI versions of Silentype can be found in Apple Service Bulletin #39.

## 2. MODIFYING THE EMI CARD

To modify the EMI card for use with a non-EMI chassis, you must solder a jumper wire across two solder pads provided on the card for that purpose (see Figure 1, B). Follow the procedure below:

- Find the two solder pads on the deserializer card (Figure 1, B). If the holes are filled with solder, open them using a soldering iron and solder sucker.
- Take a one-inch piece of 20- to 24-gauge insulated wire. Remove approximately 1/4 inch of insulation from each end of the wire.
- Insert one end of the jumper through the hole in one of the solder pads (from the trace side of the board). Solder it into place. Do the same for the other end and the other solder pad.
- Snip off any excess jumper wire that may protrude on 4. the other side of the card.
- 5. Install the deserializer card in the printer as usual. Note that the left margin switch wire from the chassis should connect to post J5 on the card and that J6 (Figure 1, C) will not be used.



## Silentype Printer Technical Procedures

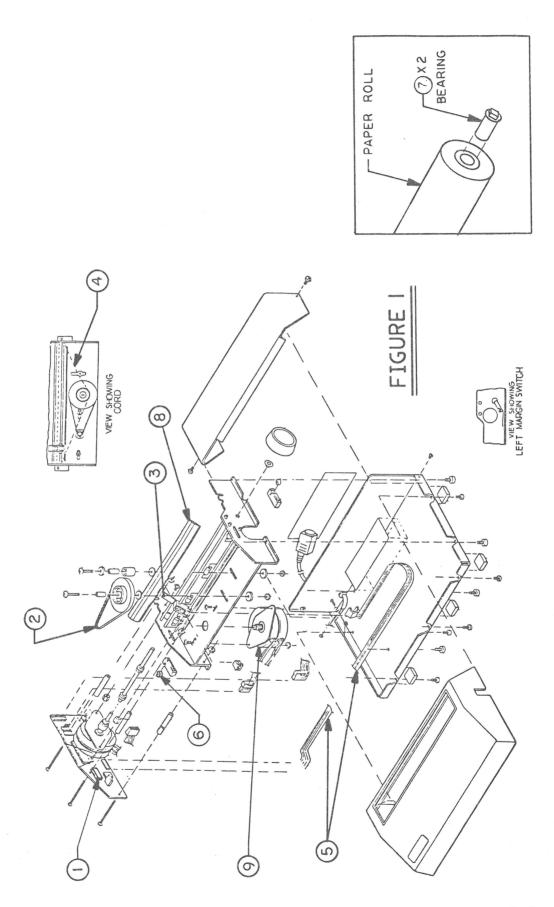
## Section 6

## Illustrated Parts List

The figures and lists below include all piece parts that can be purchased separately from Apple for the Silentype Printer, along with their part numbers. These are the only parts available from Apple. Refer to your Apple Service Programs manual for prices.

## Contents:

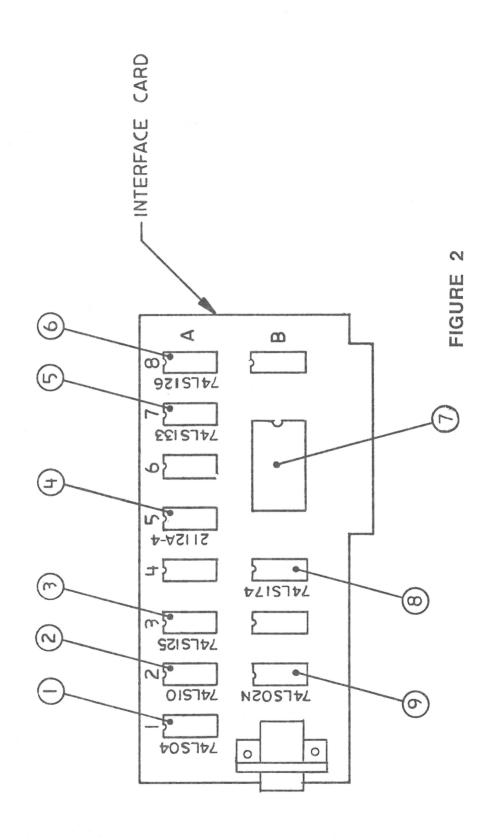
Printer		 	 6.3
Interface Card	ICs	 	 6.5



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## SILENTYPE PRINTER (Figure 1)

Item	Part No.	Description
1	305-0000	IC 74LS00N
2	970-0443	Head Drive Belt
3	970-0418	Print Head, Silentype
4	970-0442	Dacron Cord
5	970-0401	Head Cable
6	970-0410	Cord Pulley
7	970-0406	Paper Bearing Assembly
8	970-0402	Silentype Platen
9	970-0404	Motor, Head Assembly T200-01



## SILENTYPE PRINTER - INTERFACE CARD ICs (Figure 2)

Item	Part No.	Description
1	306-0004	IC 74LS04
2	305-0010	IC 74LS10
3	306-0125	IC 74LS125
4	334-2112	RAM 256x4 2112A-4
5	306-0133	IC 74LS133
6	305-0126	IC 74LS126
7	342-0039	ROM Silentype Control
8	306-0174	IC 74LS174
9	306-0002	IC 74LS02N

## **★** Apple Technical Procedures

# **Dot Matrix Printer**

## **Technical Procedures**

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**Dot Matrix Printer** 

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# **★** Apple Technical Procedures

# **Dot Matrix Printer**

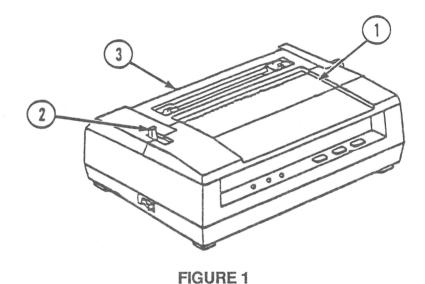
# Section 1 - Introduction

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1.6	Load Ribbon Cartridge
1.7	Run Self-Test
1.8	Set Configuration Switches
1.10	SW 1 Switch Settings
1.12	SW 2 Switch Settings
1.14	Periodic Maintenance

# □ POWER ON AND OFF

- 1. Plug the power cable into the back of the printer.
- 2. Plug the power cable into an electrical outlet.
- 3. Flip the power switch to ON.
- 4. Check the front panel. Make sure the POWER light comes on.
- 5. Flip the power switch to OFF.



#### **LOAD PAPER**

- 1. Make sure the power is off.
- 2. Raise the paper cutter toward you. (See Figure 1, #1.)
- 3. Pull the paper release lever forward. (See Figure 1, #2.)
- 4. Remove the paper cover. (See Figure 1, #3.)
- 5. Pull the paper roller shaft forward. (See Figure 2, #1.)
- 6. Lift the covers off the right and left tractor sprockets. (See Figure 2, #2.)
- 7. Make sure the left tractor is all the way over to the left. To adjust the tractor, push back the white lever. (See Figure 2, #3.) Move the tractor all the way over to the left. To lock the tractor in place, pull the white lever back toward you.

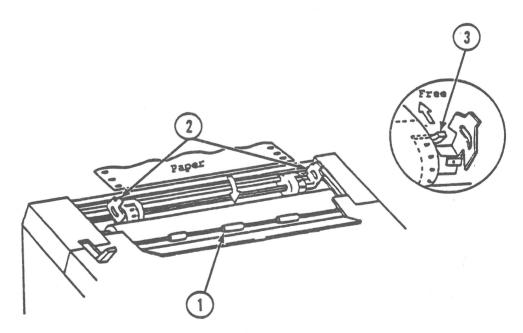


FIGURE 2

- 8. Insert the paper over sprockets. If the paper doesn't line up with the sprockets, adjust the right tractor until it does.
- 9. Push down the covers on right and left tractor sprockets.
- 10. Turn the platen knob until the paper comes through.
- 11. Push back the roller shaft.
- 12. Push back the release lever.
- 13. Put the paper cover back on.
- 14. Push back the paper cutter.

# ☐ REMOVE PAPER

- 1. Make sure the power is off.
- 2. Pull the paper cutter toward you.
- 3. Remove the paper cover.
- 4. Pull the release lever forward.
- 5. Turn the platen knob to back out the paper.

# ☐ REMOVE RIBBON CASSETTE

- 1. Make sure power is off.
- 2. Remove the carrier cover. (See Figure 3, #1.)

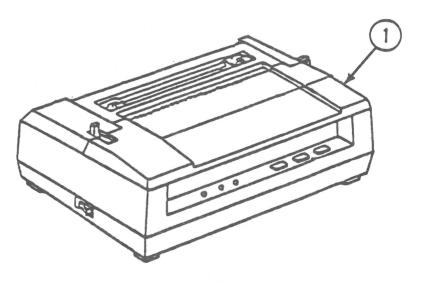


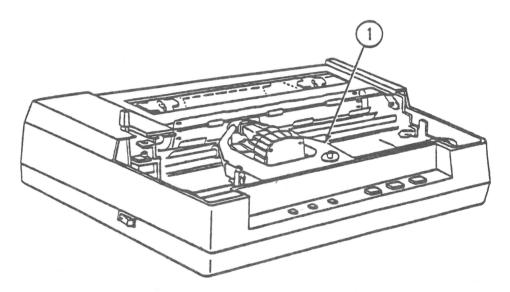
FIGURE 3

- 3. While pushing down on the cassette latch arms, lift up the cassette.
- 4. Replace the carrier cover.

**Dot Matrix Printer** 

# □ LOAD RIBBON CASSETTE

- 1. Make sure the power is off.
- 2. Remove the carrier cover.
- 3. Get a ribbon cassette.
- 4. Put the cassette on the ribbon support plate.
- 5. Push down on the cassette until it snaps in place. (See Figure 4, #1.)



#### FIGURE 4

6. On the cassette, turn the knob as shown until you hear it "click" and the ribbon is taut. (See Figure 5, #1.)

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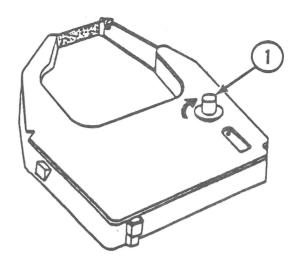


FIGURE 5

7. Replace the carrier cover.

#### RUN SELF-TEST

**Note:** When you run the self-test, you should always use a brand new ribbon and a single sheet of paper. Before you begin the test, push up the red head adjusting lever on the right side of the printer.

- 1. Make sure the power is off.
- 2. Load the paper. Make sure the paper is secure under the roller shaft.
- 3. To run self-test, press and hold the T.O.F. switch on the front panel, then switch the power on. The printer will then start printing out lines of characters. Each line contains the letters of the alphabet, the numbers 0 through 9, and a series of typographical characters.
- 4. To end the test, set the power switch to OFF.

# □ SET CONFIGURATION SWITCHES

Materials Required A tiny flat blade screwdriver

#### **Procedures**

- 1. Make sure the power is off.
- 2. Remove the paper and the carrier cover.
- 3. Slide the carrier all the way to the left. (See Figure 6, #1.)
- 4. Locate switches SW 1 and SW 2. (See Figure 6, #2.)
- 5. Pull the plastic strip out of the way.

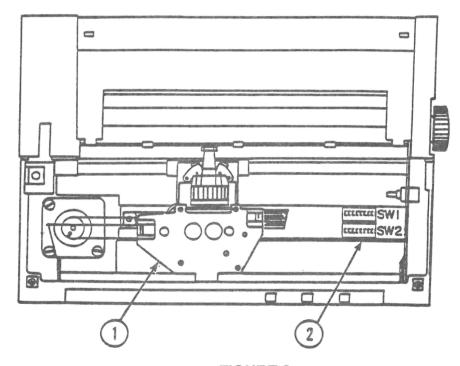


FIGURE 6

6. Using a small screwdriver, set all the SW 1 switches to OPEN. (See Figure 7.)



FIGURE 7

7. Using the chart on the next page, set all SW 1 switches to their normal setting.

#### **SW 1 SWITCH SETTINGS**

SWITCH	NORMAL SETTING	PURPOSE
1	OPEN	Switches 1-3 select which set of national characters will be printed.
2	CLOSED	If you set the switches to OPEN, CLOSED, OPEN, the printer will print
3	OPEN	United States characters.
4	OPEN	Switch 4 selects paper length. Set the switch to OPEN for paper that is 11 inches long. (66 lines)
,5	OPEN	Switch 5 determines if a host computer can put the printer on-line and off-line. If you set the switch to OPEN, the host computer will have this capability.
6	OPEN	The computer sends characters to the printer. Sometimes the printer stores these characters without receiving a command to print them. When the printer's memory is full, it can do one of two things when it receives a print command. 1) It can go to a new line on the page and begin printing. 2) It can print from wherever the print head is at the time the print command is received. Normally, you want the printer to start where it left off, so set switch 6 to OPEN.
7	CLOSED	The computer tells the printer to start printing by sending a print command. There are a number of print commands. They include Carriage Return, Linefeed, Vertical Tab, and Formfeed characters. Normally, you want any of these characters to start printing. So set Switch 7 to CLOSED. If Switch 7 is set to OPEN, only a Carriage Return character will start printing.
8	OPEN	If the host computer sends a Linefeed following the Carriage Return, set switch to OPEN. If host does not send the Linefeed, the printer will add a Linefeed when switch is CLOSED.

8. When you finish setting the switches, make sure SW 1 looks like this:

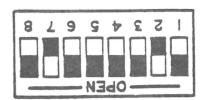


FIGURE 8

- 9. Using a small screwdriver, set all SW 2 switches to OPEN.
- 10. Using the chart on the next page, set all SW 2 switches to their normal setting.

#### **SW 2 SWITCH SETTINGS**

SWITCH	NORMAL SETTING	PURPOSE
1	CLOSED	The number zero can be printed with a slash through it. This way the user won't confuse it with the letter O. Set the switch to CLOSED to print slashed zeroes.
2	OPEN	This switch determines the size of the printer's memory. To get the largest memory possible, set this switch to OPEN. CLOSED is only 1 line buffer.
3	Not Used	The printer doesn't use these switches.
4	Not Used	It doesn't matter if they are OPEN or CLOSED.
5	CLOSED	Set to OPEN for 10 characters per each inch regardless of the size of each character. Set to CLOSED to have the printer adjust spacing for character size. Other print modes are software selectable.
6	CLOSED/ OPEN	This switch tells the printer to expect either a 7-bit or 8-bit data from the computer. If you're using an interface that uses 7-bit data, set it to CLOSED. If you're using an 8-bit interface, set it to OPEN.
7	CLOSED	If this switch is set to CLOSED, the printer will be automatically on-line (SEL LIGHT) whenever it is turned on. If you want the printer to be off-line, (NOT SEL) however, set it to OPEN.
8	OPEN	If this switch is set to OPEN, the printer will be able to print in both directions. If you set it to CLOSED, the printer will only be able to print from left to right.

11. When you finish setting the switches, make sure SW 2 looks like this:

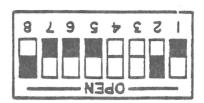


FIGURE 9

- 12. Push the plastic strip back over the switches.
- 13. Replace the carrier cover.
- 14. Run the self test.

#### □ PERIODIC MAINTENANCE

You should clean the printer as required. You should lubricate the printer only once a year.

- 1. Make sure the power is off.
- 2. Remove the paper cover and the carrier cover.
- 3. Remove the paper and ribbon cassette.
- 4. On the carrier shaft, wipe off any dirt with dry gauze or absorbent cotton. (Figure 10, #1.)
- 5. On the lubrication ring, apply a small amount of lubrication oil. (Figure 10, #2.)

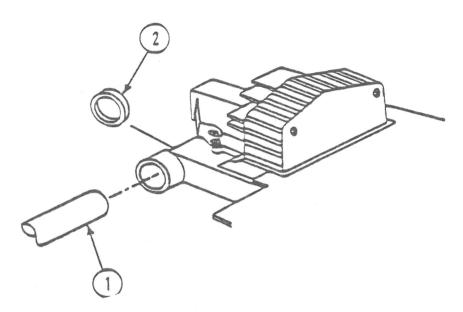


FIGURE 10

6. Find the detector plate. It is on the left front side of the printer, hidden just below the guide rail. (Figure 11, #1.)

7. Using a brush, remove any paper dust. (Figure 11, #2.)

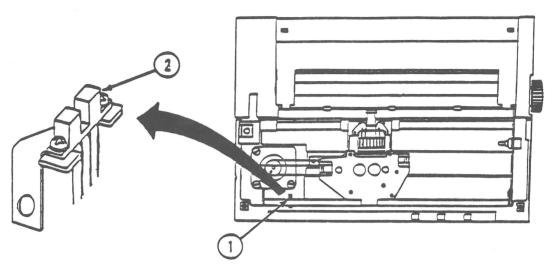


FIGURE 11

8. Clean the dot head (Figure 12, #1) with a low residue cleaner, such as isopropyl alcohol or freon, and a lint-free cloth.

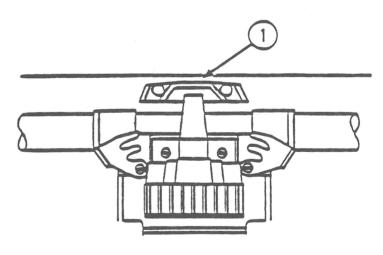


FIGURE 12

9. Replace the ribbon cassette.

# **★** Apple Technical Procedures

# **Dot Matrix Printer**

# Section 2 - Take-Apart

# **CONTENTS**

2.3	Switch Panel
2.6	Ribbon Wire
2.10	CPU PC Board
2.14	Dot Head
2.15	Adjustment
2.16	Carrier Wire
2.26	Mechanical Assembly
2.30	Carrier Motor
2.32	Transformer
2.34	Carrier Motor Driver Transistor

#### **SWITCH PANEL**

#### **Materials Required**

Two Phillips screwdrivers (#1, #2) Small flat blade screwdriver

#### Remove

- 1. Remove the power cord from printer.
- 2. Remove the carrier cover.
- 3. Pull off the platen knob. (See Figure 1, #1.) If it doesn't come off easily, place the blade of a flat blade screwdriver in the slot of the shaft of the platen knob (i.e., where the knob attaches to the platen). Twist the screwdriver, thereby widening the knob so you can pull it off.

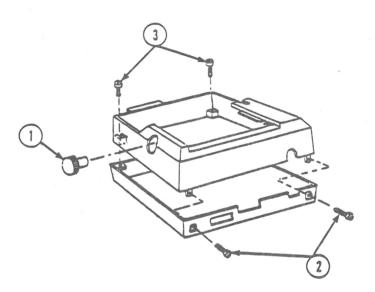


FIGURE 1

- 4. To remove the top cover, remove the two screws at the rear of printer. (See Figure 1, #2.)
- 5. Remove the two screws at the front of printer. (See Figure 1, #3.)
- 6. Lift the top cover up. Place it face down on the table.

7. Remove the six screws from the back of the switch panel. (See Figure 2, #1.)

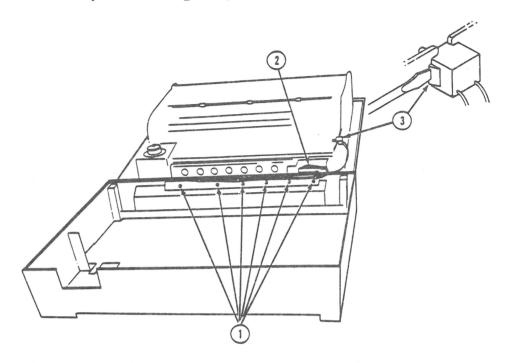


FIGURE 2

- 8. Pull the switch panel connector from the CPU board. The connector is in the "well" at the right front of the printer. Reach down into the "well" to find it. If you have trouble getting the connector free, carefully use a flat bladed screwdriver to pry it loose. (See Figure 2, #2.)
- 9. Using a flat blade screwdriver, depress the latches on both sides of the limit switch and push the switch in toward the center of the printer. (See Figure 2, #3.) Lift the wire free from the slot.
- 10. Pull the switch panel free.

### Replace

- 1. Put the switch wire back into the slot. Push the limit switch back until it clamps in place. It should be snug with side frame.
- 2. Attach the switch panel connector to the CPU board.
- 3. Replace the six screws in the back of the switch panel.
- 4. Pull the top cover back over the printer.
- 5. Replace the carrier cover and the platen knob.
- 6. Plug the printer back in.
- 7. Power on. Check that power lamp lights.

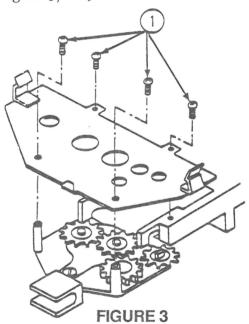
#### ☐ RIBBON WIRE

#### **Materials Required**

Small Phillips screwdriver

#### Remove

- 1. Remove the power cord.
- 2. Lift off the carrier cover and pull off the platen knob.
- 3. Lift off the top cover. Set it face down.
- 4. For easier access to the ribbon wire, disconnect the top cover from the printer. To do this, pull the switch panel connector from CPU board. Push the limit switch in toward center of board and lift the wire free. Remove the top cover and set it out of the way.
- 5. Remove the ribbon cassette.
- 6. Remove the four cassete mount plate fixing screws. (See Figure 3, #1.)



7. Slowly lift off the cassette mount plate.

**Note:** There are springs beneath the cassette mount plate (See Figure 4). They may pop out when you lift up the mount plate.

8. Pull up the ratchet gear and ratchet spring. (See Figure 4, #1.) If they don't come off easily, carefully pry them off with a flat blade screwdriver.

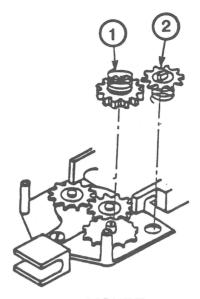


FIGURE 4

- 9. Pull off the cassette drive gear and the ribbon spring. (See Figure 4, #2.)
- 10. Notice how the ribbon wire is wrapped around the ribbon pulley gear. (See Figure 5, #1.) Also, notice how the ribbon wire goes through the carrier assembly. This will help you when you have to replace the ribbon wire.

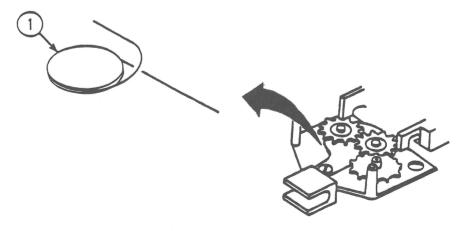
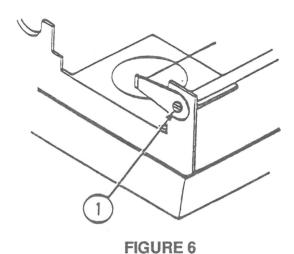
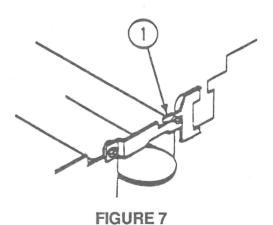


FIGURE 5

11. Loosen the screw on the ribbon wire arm on the left side of the printer (See Figure 6, #1.) Just give it a few turns to ease the tension on the wire.



12. Remove the wire from the wire holder on the right side of the printer. (See Figure 7, #1.)

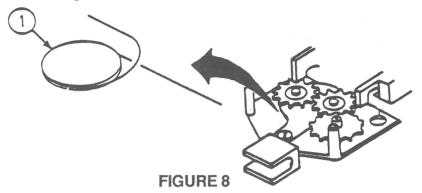


13. Remove the other end of the wire from the wire holder on the left side of the printer.

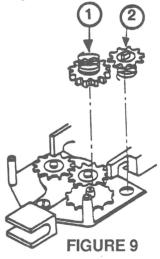
14. Work the wire free from the ribbon pulley gear. Pull the wire out of the printer.

#### Replace

- 1. Attach one end of the ribbon wire to the wire holder on the right side of the printer.
- 2. Work the wire around the pulley gear as shown. (See Figure 8, #1.)



- 3. Attach the other end of the ribbon wire to the wire holder on the left side of the printer.
- 4. Tighten the ribbon wire arm.
- 5. Replace the ratchet spring and ratchet gear. (See Figure 9, #1.)



- 6. Replace the ribbon spring and cassette drive gear. (See Figure 9, #2.)
- 7. Replace the cassette mount plate and ribbon cassette.
- 8. Replace the top cover, carrier cover, and platen knob.
- 9. Run the self-test.

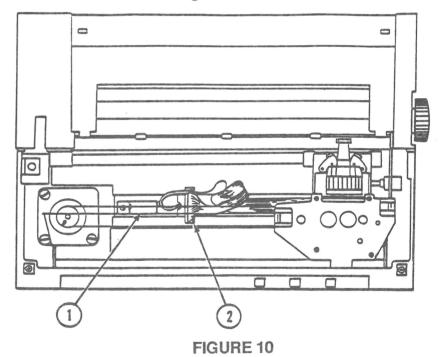
#### □ CPU PC BOARD

#### **Materials Required**

5.5mm Nutdriver 8mm Nutdriver Phillips Screwdriver

#### Remove

- 1. Disconnect the power cord.
- 2. Remove the carrier cover, the paper cover and the platen knob.
- 3. Remove the top cover. Be sure to detach the switch panel connector from the CPU PC board. Put the cover somewhere out of the way.
- 4. Slide the carrier all the way to the right.
- 5. Loosen, but do not remove, the metal clip and gently pull up the ribbon until you can reach the dot head connector. (See Figure 10, #1.)



6. Gently work free the dot head connector. (You might use the needle nose pliers to grasp the connector.) (See Figure 10, #2.)

- 7. Tuck the dot head connector under the cable so it stays out of the way.
- 8. Using a pad or cushion for protection, set the printer on its back. (See Figure 11.)

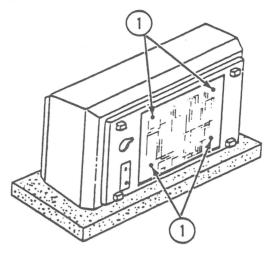


FIGURE 11

- 9. Use a 5.5mm nutdriver to remove the four nuts from the bottom panel.
- 10. Pull off the panel.
- 11. Use an 8mm nutdriver to remove the four CPU PC board nuts. (See Figure 11, #1.)
- 12. Gently pull the board toward you. This will help you reach the plastic connectors on the board.
- 13. Using your fingers, work off the plastic connectors. (Do not pull on cable.) As you disconnect them, note the position of each connector.

#### CAUTION: The board can be damaged by static electricity.

- 14. When you have all the connectors off, lay the board down on table.
- 15. Slide the chassis grounding strap (Figure 12, #1) off the ground lug.

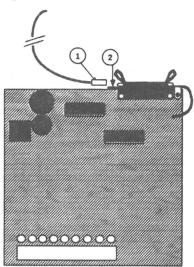


FIGURE 12

**IMPORTANT:** Leave the ground lug (Figure 12, #2) attached to the board. If you send the board to Apple for exchange, all ground lugs must be present on the board.

16. To avoid damaging the board, be careful not to handle the surface of the board. When you carry away the board, be sure to hold it by its edges.

Replace

- 1. Line up the board with printer.
- 2. Connect the grounding strap.
- 3. Connect the six plastic connectors.
- 4. Replace the four CPU PC board nuts.
- 5. Push the bottom window back into place. Connect the four window nuts.

- 6. Turn the printer right side up.
- 7. Push the dot head connector back into CPU PC board. (See Figure 13, #1.)

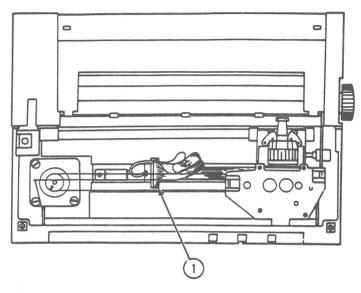


FIGURE 13

- 8. Fold the dot head cable under the metal clip. Tighten down the metal clip.
- 9. Slide the carrier back and forth a few times. It should slide freely from end to end. If the carrier catches on the metal clip, go back and re-fold the dot head cable.
- 10. Replace the top cover. Be sure to plug the switch panel connector back into the CPU PC board.
- 11. Replace the carrier cover, the paper cover, and the platen knob.
- 12. Turn the power on.
- 13. Perform the self-test.

#### **DOT HEAD**

#### **Materials Required**

.06 mm feeler gauge

#### Remove

- 1. Disconnect the power cord.
- 2. Remove the carrier cover.
- 3. Remove the ribbon cartridge.
- 4. To free the dot head, slide out both dot head latches. (See Figure 14, #1.)

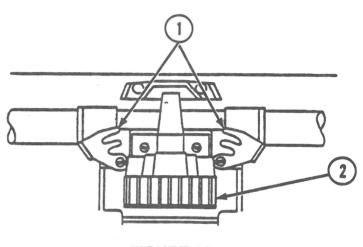


FIGURE 14

5. Pull up the dot head. (See Figure 14, #2.) If you have trouble getting it out, pull the paper roller shaft forward. Ease the dot head around the roller shaft.

#### Replace

- 1. Push in the dot head. If you have trouble getting it in, pull the paper roller shaft forward. Ease the dot head around the roller shaft.
- 2. To lock the dot head in place, slide in the two dot head set latches.

1. Push in on the head adjusting lever until it is pointing up. (See Figure 15, #1.)

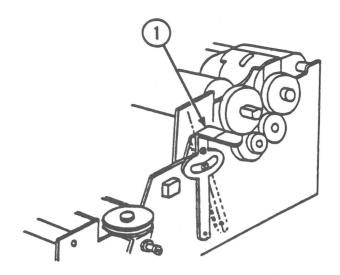


FIGURE 15

2. Using a feeler gauge, check that the gap between the head needle and the platen is .06mm or .024 +/-.001 inches. (See Figure 16, #1.) This is the right gap for a single sheet of paper. Try sliding through the platen a single sheet of paper. It should go through with just a little drag.

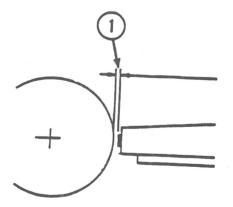


FIGURE 16

3. If the gap is off, adjust the head adjusting lever until the gap is correct.

#### **CARRIER WIRE**

#### **Materials Required**

Small Phillips screwdriver Small flat blade screwdriver Needlenose pliers Adjustable wrench Tension gauge Pulley Remover Ruler

#### Remove

- 1. Disconnect the power cord.
- 2. Remove the paper cover, the carrier cover, and the top cover. Set the top cover somewhere out of the way.
- 3. Remove the dot head.
- 4. Remove the two screws holding the dot head connector. (See Figure 17, #1.)

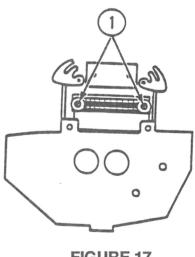
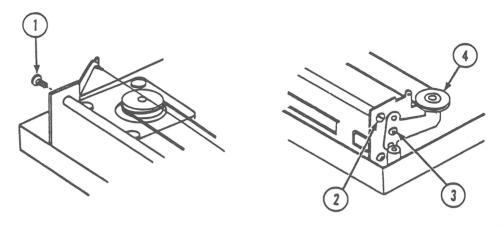


FIGURE 17

- 5. Lift up the connector and move it out of the way.
- 6. Free both ends of the ribbon wire. Loop the ends over the carrier and tie them together out of the way.

7. Remove the screw on the left end of the carrier guide shaft (See Figure 18, #1) and set aside the ribbon wire arm.



#### FIGURE 18

- 8. Remove the screw on the right end of the shaft. (See Figure 18, #2.)
- 9. Pull out the carrier guide shaft.
- 10. Move the carrier to the right side.

11. Use a phillips screwdriver to remove the screw from the top of the motor pulley.

(See Figure 19, #1.)

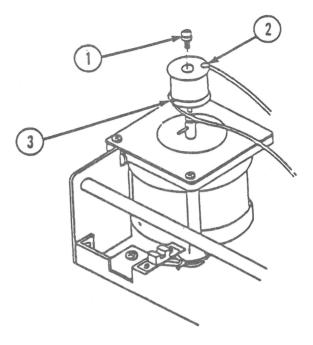
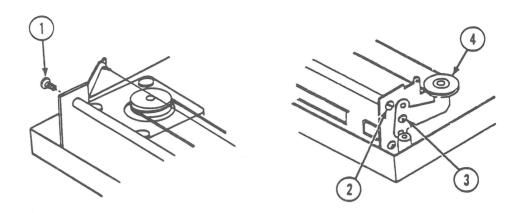


FIGURE 19

**Note:** The pulley can be stopped from turning by holding the carrier in place.

12. Loosen the screw on the tension arm. (See Figure 20, #3.)



#### FIGURE 20

- 13. Slip off the wire from the idler pulley. (See Figure 20, #4.)
- 14. Remove the top end of the carrier wire. (See Figure 19, #2.)

15. Use the pulley remover to take off the motor pulley. Slide the pulley remover onto the top of the pulley and turn the screw clockwise until the pulley is free. (See Figure 21.)

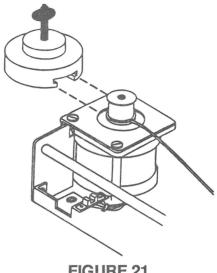
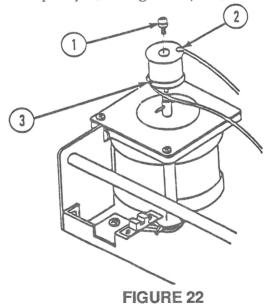


FIGURE 21

Note: At this time, make sure that two copper shims are on the arms of the motor pulley shaft.

- 16. Unwind the carrier wire.
- 17. Remove the bottom end of the carrier wire from the motor pulley. (See Figure 22, #3.)



18. Raise up the carrier.

19. Using an adjustable wrench, hold the nut on the right side of the carrier wire in place. (See Figure 23, #1.) Using a needlenose pliers, remove the wire nut on the left side of the carrier wire. (See Figure 23, #2.)

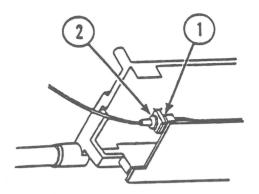


FIGURE 23

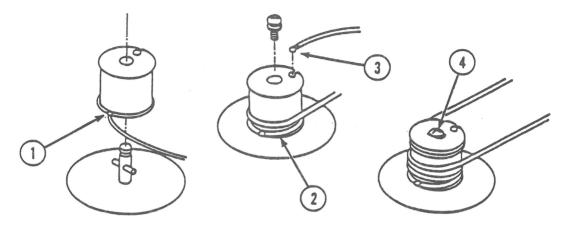
20. Grab the carrier wire on either side of the black rubber sleeve. Pull out the carrier wire, the nuts, and the sleeve.

**Note:** When you remove the carrier wire, first push out the metal shim which is inside, then the wire, the two nuts, and the black rubber sleeve will all come out together. The wire does not slide out of the two nuts. You must pull the wire, the nuts, and the sleeve out of the slot at the bottom of the carrier assembly.

#### Replace

- 1. Raise up the carrier.
- 2. Before you insert the new carrier wire, make sure that the long end of the wire runs toward the right side of the printer.
- 3. Push the black rubber sleeve and metal shim back into the slot at the bottom of the carrier assembly. Tighten the wire nut.
- 4. Take the long end of the wire and wrap it around the idler pulley. The idler pulley is on the far right side of the printer.

- 5. Work the long end of the wire under the carrier assembly until it reaches the left side of the printer.
- 6. Insert the long end of the wire into the bottom slot on the motor pulley. (See Figure 24, #1.)



#### FIGURE 24

- 7. Make sure that the two copper shims are still on the arms of the motor pulley shaft.
- 8. Seat the motor pulley on the shaft. (See Figure 24, #2.)
- 9. Hold the wire snug against the motor pulley with your thumb. Turn the pulley in a clockwise direction and wind up the carrier wire.
- 10. Insert the short end of the wire into the top slot of the motor pulley. (See Figure 24, #3.)

- 11. Wrap the wire around the pulley in a clockwise direction.
- 12. Replace the motor pulley screw. (See Figure 24, #4.)
- 13. Replace the front guide rail.
- 14. Tighten the tension screw until the wire is taut. (See Figure 25, #1.)

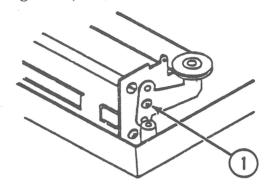


FIGURE 25

- 15. Replace the two front guide rail screws and ribbon wire arm.
- 16. Until the ribbon wire.
- 17. Attach the right end of the ribbon wire to the ribbon wire post just above the idler pulley.
- 18. Attach the left end of the ribbon wire to the ribbon wire post just above the motor pulley.

**Note:** If the ribbon wire comes off of the ribbon pulley gear, you must put it back on.

19. Replace the dot head connector. (See Figure 26, #1.)

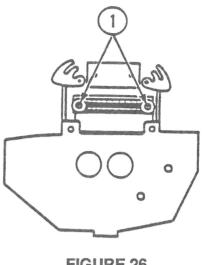


FIGURE 26

20. Replace the dot head.

21. With the carriage assembly at the far left, push the carrier wire at its center with a tension gauge. (See Figure 27, #1.)

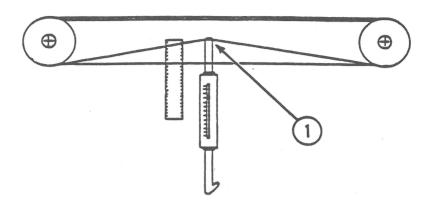


FIGURE 27

- 22. When the wire is slackened 3/8 of an inch at the center, check the gauge. It should read 1 LB. If it doesn't, adjust the screw of the tension arm.
- 23. Replace the top cover, the carrier cover, and the paper cover. Load paper and a ribbon cassette.
- 24. Run the self-test.

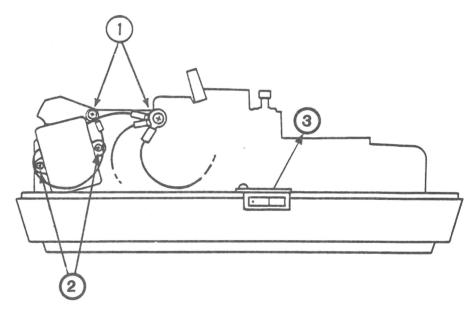
## □ MECHANICAL ASSEMBLY

#### **Materials Required**

Small phillips screwdriver 5.5mm Nutdriver 8mm Nutdriver

#### Remove

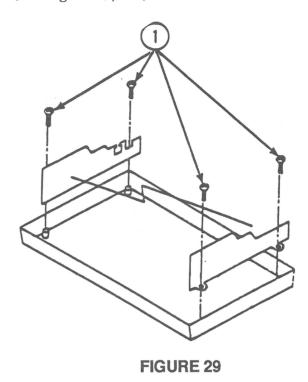
- 1. Disconnect the power cord.
- 2. Remove the paper cover, the carrier cover, and the top cover. Set the top cover down out of the way.
- 3. Remove the CPU board.
- 4. Remove the screw and washers holding ground straps to the side frame. (See Figure 28, #1.)



#### FIGURE 28

- 5. Remove the two screws from the noise filter. (See Figure 28, #2.)
- 6. Gently pull the noise filter away from the frame.
- 7. Remove screw from plate over power switch. (See Figure 28, #3.)

- 8. Lift power switch out of its slot.
- To free the mechanical assembly, remove the four screws holding it to the printer. (See Figure 29, #1.)



10. Lift the mechanical assembly out of the printer.

## Replace

- 1. Put mechanical assembly back into the case.
- 2. Replace the four screws. (See Figure 30, #1.)

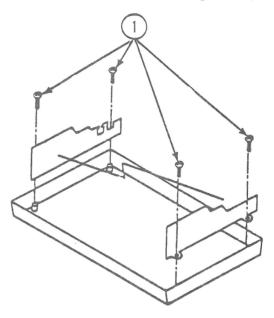
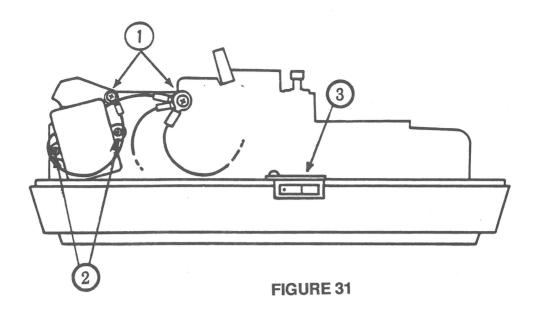


FIGURE 30

- 3. Position the noise filter on the frame. It goes at an angle. (See Figure 31, #1.)
- 4. Replace the noise filter screws.
- 5. Put together the screw, washer, three ground cables, and star washer. Screw them into the side frame. Do the same with the fourth ground cable. (See Figure 31, #2.)
- 6. Put the power switch back into its slot.



- 7. Replace the plate over the power switch. (See Figure 31, #3.)
- 8. Replace the CPU board.
- 9. Replace the top cover, carrier cover, and paper cover.
- 10. Load paper and ribbon cassette.
- 11. Power on and perform the self-test.

## □ CARRIER MOTOR

#### **Materials Required**

Medium flat blade screwdriver Phillips screwdriver Pulley remover

#### Remove

- 1. Make sure the power is off.
- 2. Remove the mechanical assembly from the printer.
- 3. Loosen the ribbon wire tension arm.
- 4. Free the ribbon wire from the two ribbon wire posts.
- 5. Tie the wire in a loose knot over the carrier.
- 6. Remove the motor pulley.
- 7. Remove the three motor mounting screws. (See Figure 32, #1.)

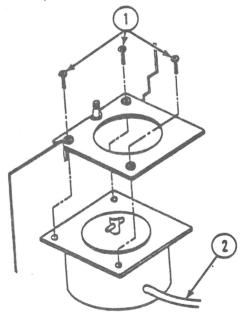


FIGURE 32

**Note:** When you remove the last screw, the motor will drop out of the mechanical assembly. As you remove the last screw, hold on to the motor. Carefully note the position of the motor cable. (See Figure 32, #2.) Then let motor fall free.

#### Replace

- 1. From the front side of the mechanical assembly, put the motor in its slot. Make sure the cable is on the right side of the motor. It should be pointing in the general direction of the idler pulley.
- 2. Replace the three motor mounting screws. Do not over tighten them.
- 3. Replace the motor pulley.
- 4. Put the motor pulley back on the motor.
- 5. Replace the motor pulley screw.
- 6. Untie the ribbon wire.
- 7. Fix the ribbon wire to the ribbon wire posts.
- 8. Tighten the ribbon wire arm.

## ☐ TRANSFORMER

**Materials Required** 

Needlenose pliers Small Phillips screwdriver

Remove

- 1. Remove the mechanical assembly.
- 2. Remove the two screws from the transformer. (See Figure 33, #1.)

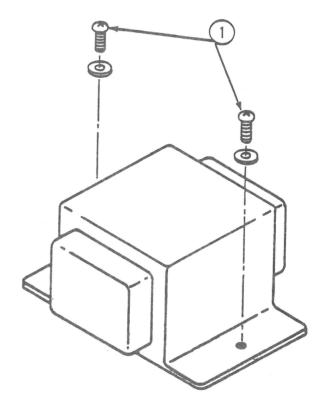


FIGURE 33

## Replace

1. Make sure the threaded plate under the bottom of the printer is in position. (See Figure 34, #1.)

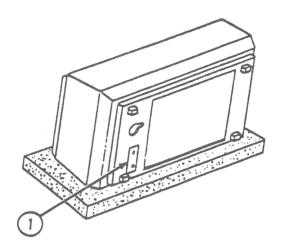


FIGURE 34

- 2. Put the transformer in place.
- 3. Screw down the transformer.

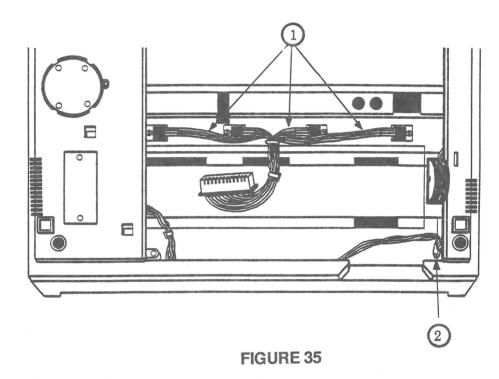
# ☐ CARRIER MOTOR DRIVER 5V TRANSISTOR ASSEMBLY

**Materials Required** 

Heat sink compoun Phillips head screwdriver

Locate

- 1. Remove the mechanical assembly.
- 2. Turn the mechanical assembly upside down and place it on a protective pad.
- 3. Note the location of the transistor assembly in Figure 35, #1.



rev. Nov 82

# Remove and Replace

- 1. Remove the mechanical assembly.
- 2. Turn the mechanical assembly upside down and place it on a protective pad.
- 3. Remove the screw from the 5V transistor assembly (Figure 35, #2) and carefully remove the transistor.
- 4. To replace the 5V transistor assembly, spread a thin layer of heat sink compound on the mechanical assembly. Place the sheet of mylar on top of it. Apply a layer of heat sink compound on top of the mylar, and screw on the transistor.

# **4** Apple Technical Procedures

# **Dot Matrix Printer**

# Section 3 - Troubleshooting

# **CONTENTS**

3.2 Symptom Table

**Note:** The Dot Matrix Printer should be tested with the Apple II Peripherals Diskette. (See Multi-Product Diagnostics Technical Procedures, Section 1.)

#### SYMPTOM TABLE

#### **Problems**

#### Solutions

- No Power
- 1. Check that the power cord is plugged in.
- 2. Check if the power fuse at the back of the printer is burned out. If it is, replace it and power on again. If the fuse blows a second time, swap components in this order:
  - Regulator transistor
  - CPU PC board
  - Carrier Motor
  - Transformer
- 3. If the fuse is O.K., you may have a bad power switch. Try replacing it. If that doesn't take care of the problem, swap the Carrier Motor and then the Transformer.
- Power Comes
   On But Printer
   Won't Print
- 1. Check if the top cover is seated properly. If it isn't, close it. Then press SEL and try self-test.
- 2. Check if PE lamp is lit on front panel. If it is, reload the paper and try self-test.
- 3. Check the connectors between the carrier and carrier motor and the CPU PC board. If any of the connectors are loose, connect them.
- 4. Try swapping components in this order:
  - CPU PC board
  - Carrier motor
  - Transistor assembly
- Printer Passes
   Self-Test But
   Won't Print Under
   Computer Control
- 1. Check that the computer is properly powered on and initialized.
- 2. Make sure there isn't a software problem.
- 3. Make sure that the interface cable between the printer and the computer is connected at both ends.
- 4. Check if SEL light is on. If it's off, press SEL and try printing under computer control. If it prints while light is off, replace the switch panel.
- 5. Replace CPU PC board.

#### **SYMPTOM TABLE**

#### **Problems**

#### Solutions

- Print Quality Problem: Dots Missing
- 1. Make sure dot head is in place.
- 2. Make sure dot head is not clogged with dust or dirt.
- 3. Make sure dot head connector is plugged properly into CPU PC board.
- 4. Make sure gap adjustment lever is set properly.
- 5. Try replacing components in this order:
  - Dot head
  - CPU PC board
- Print Quality Problem:
   Printing Too Light
- 1. Check if ribbon is old, torn, frayed, or twisted.
- 2. Check if ribbon wire tension is too loose and adjust as necessary.
- 3. Check if gap adjustment lever is set properly.
- 4. Adjust intensity pot. To do this, lift the clear plastic sheet that covers the configuration switches. Locate VR2 IMPRES. Insert a screwdriver into the slot on VR2. Turn the screwdriver.
- 5. Try replacing components in this order:
  - Ribbon cassette
  - Dot head
  - CPU PC board
- Print Quality Problem: Characters Not Spaced Properly
- 1. Check if carrier wire is strung properly.
- 2. Try swapping components in this order
  - Carrier wire
  - Carrier motor
  - CPU PC board

#### SYMPTOM TABLE

#### **Problems**

## Print Quality Problem: Characters Do Not Align Vertically Between Rows

## Solutions

- 1. Adjust bidirectional pot. To do this, push back the clear plastic sheet the covers the configuration switches. Locate VR1 ALIGN. Insert a a screwdriver into the slot on VR1. Turn the screwdriver.
- Carrier Assembly Moving Carrier Shaking Erratically Moving Slowly, or Giving Off Burning Odor
- 1. Try swapping components in this order
  - Carrier motor
  - Transistor assembly
  - CPU PC board

# **★** Apple Technical Procedures

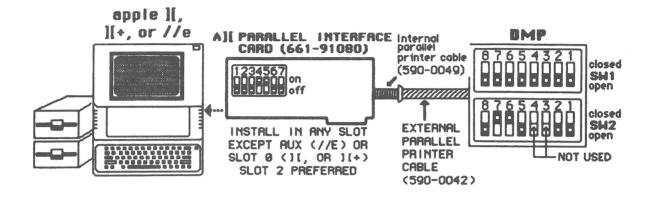
# **Dot Matrix Printer**

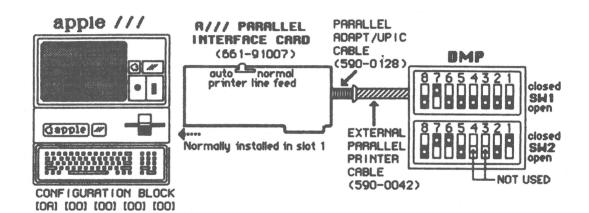
# Section 4 - Appendix

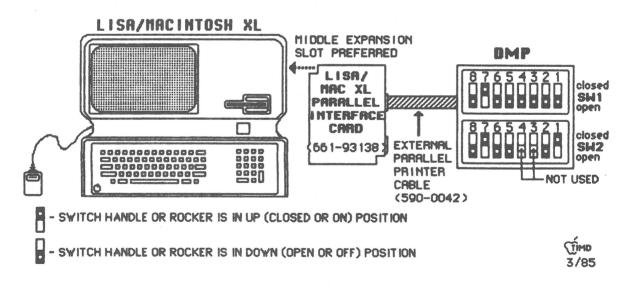
# **CONTENTS**

4.3 Dot Matrix Printer Configuration

## **DOT MATRIX PRINTER CONFIGURATION**







## **Apple Technical Procedures**

# **Dot Matrix Printer**

## Section 5 - Illustrated Parts List

## **CONTENTS**

- 5.3 Mechanical Assemblies (Figure 1)
- 5.3 Transformer and Power Switch (Figure 2)
- 5.3 CPU Card (Figure 3)
- 5.5 Transistor Assemblies (Figure 4)
- 5.5 Cable (Figure 5)
- 5.5 Noise Filter (Figure 6)
- 5.6 Other Parts (ImageWriter Parts Cross-Reference)

The figures and lists in this section include all piece parts that can be purchased separately from Apple for the Dot Matrix Printer, along with their part numbers. These are the only parts available from Apple. Refer to your *Apple Service Programs Manual* for prices.

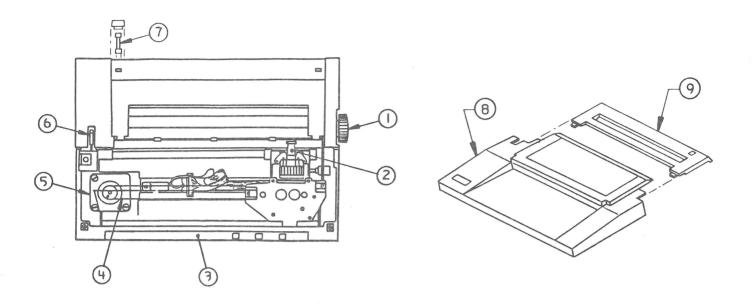
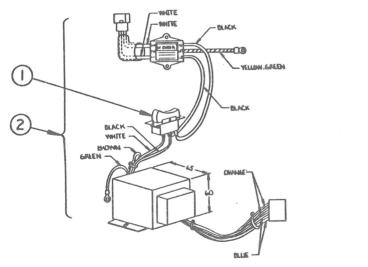


FIGURE 1





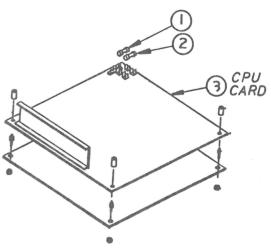


FIGURE 3

# ☐ MECHANICAL ASSEMBLIES (Figure 1)

<u>Item</u>	Part No.	<u>Description</u>
1	970-0008	Platen Knob
2	661-0315	Print Head Assembly
3	970-0007	PCB Front Panel w/harness
4	970-0080	Carriage Drive Wire
5	699-0093	Carriage Drive Motor, Complete
6	970-0009	Paper Release Lever
7	740-0101	Fuse, 2 Amp, 3AG
8	970-0078	Carrier Cover, 110V
9	970-0077	Paper Cover

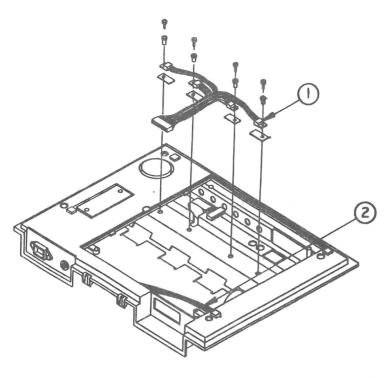
# ☐ TRANSFORMER AND POWER SWITCH (Figure 2)

1 970-0011 AC Line Switch, 115V

2 699-0095 Transformer/Switch Assembly

# □ CPU CARD (Figure 3)

1 740-0022 Fuse, 5 Amp 2 740-0021 Fuse, 3 Amp 3 661-75091 DMP CPU Card



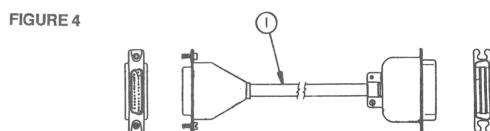


FIGURE 5

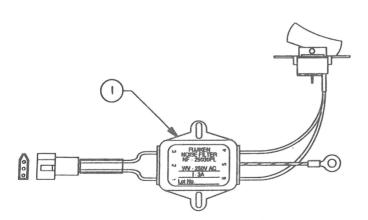


FIGURE 6

# ☐ TRANSISTOR ASSEMBLIES (Figure 4)

<u>Item</u>	Part No.	Description
1 2	699-0120 970-0082	Transistors Assy, Carrier Drive Transistor Assembly, 5V

# ☐ CABLE (Figure 5)

1 590-0042

Cable, External Parallel Printer

# □ NOISE FILTER (Figure 6)

1 970-0072

Noise Filter, 110V

# □ OTHER PARTS (ImageWriter Parts Cross-Reference)

If you need a part that is not listed in the Dot Matrix Printer Illustrated Parts List:

- 1. Find the corresponding part on the ImageWriter Illustrated Parts List.
- 2. Check the list below. If the part is on the list, it can be used for both printers.

Prices for these parts are listed under ImageWriter in the Service Programs Manual.

# □ IMAGEWRITER – MAIN FRAME (Figure 3)

<u>Item</u>	Part No.	<u>Description</u>
3 7 10 11 12 15 16 30 31	970-0056 970-0082 970-0051 970-0052 970-0851 970-0977 970-0054 970-0081 970-0053	Spring, Feed Roller Release Transistor Assembly, 5V Gear, Idler, Tractor Gear, Idler, Platen Motor, Paper Feed Arm, Paper Bail Spring, Paper Bail Shim, Motor Shaft Pulley, Motor
<i>J</i>	710 0025	1 4110), 1110101

# □ IMAGEWRITER – PRINT HEAD ASSEMBLY (Figure 4)

2	661-0315	Print Head, U.S.
4	970-0059	Guide, Ribbon
5	970-0067	Wiper, Felt
6	970-0842	Bearing, Carrier Assembly
7	970-0827	Retainer, Connector Cable
8	699-0113	Connector Assembly, Head
10	970-0826	Bracket, Connector Holder
11	970-0061	Gear, Ratchet 'A'
12	970-0063	Spring, Ratchet Gear
13	970-0066	Wire, Ribbon Drive
14	970-0844	Wire, Ribbon Drive - 15"
15	970-0064	Spring, Drive Gear
16	970-0060	Gear, Ribbon Drive
17	970-0062	Gear, Ratchet 'B'
18	970-0825	Arm, Ribbon Drive Wire
19	970-0875	Screw, Shoulder
20	970-0065	Gear, Change Arm
21	970-0719	Screw, Shoulder

# ☐ IMAGEWRITER – PAPER TRACTOR FEED ASSEMBLY (Figure 5)

4	970-0057	Gear, Tractor Feed
5	970-0058	Feed Roller
6	970-0055	Spring, Feed Roller
7	970-0823	Arm, Feed Roller Support
10	970-0834	Cam, Feed Roller Shaft

# ☐ IMAGEWRITER – PLATEN CARRIER DRIVE ASSEMBLY (Figure 6)

3	970-0069	Gear, Platen
5	970-0070	Arm, Carrier Wire Tension
7	970-0080	Wire, Carrier
9	970-0068	Platen Core, Rubber
12	970-0982	Cradle, Platen Guide

# □ IMAGEWRITER – BOTTOM VIEW (Figure 7)

1	860-0034	Washer, Shoulder Nylon
2	725-0006	Insulator, Silicon Rubber
5	970-0824	Plate, Transformer Cover
6	699-0120	Transistor Assembly, Carrier Drive

## APPLE DAISY WHEEL PRINTER TECHNICAL PROCEDURES

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## Apple Daisy Wheel Printer Technical Procedures

## Section 1

## Basics

## Contents:

How to Use This Manual1.3
Tools Required for DWP Service
Parts of the DWP (Diagrams)
Basic User Tasks
Printer Diagnostics: Self-Tests:
Defeating the Top Cover Interlock Switch
Terminal Self-Test
Printer Self-Test
External Loop Back Test
Printer Switch Settings:
Setting User Switches
Removing and Replacing the Top Cover
Setting Configuration Switches
Repacking the Printer for Shipping

#### HOW TO USE THIS MANUAL

If you have not worked on an Apple Daisy Wheel Printer (DWP) before --

Read and perform this section, **Basics**, before you do anything else. It will familiarize you with the basic parts and operation of the printer, show you how to run the printer self-tests, and help you perform all the other tasks more quickly.

You can use Sections 3 and 4, Take-Apart and Print Quality Adjustments, as a self-training course, by going through the procedures in order on a printer of your own. Or you can simply use the step-by-step instructions when you need them. However, since the DWP is a complicated mechanism, it's a good idea to practice the procedures before you need to use them.

#### If you are already familiar with the DWP --

Use Section 2, Troubleshooting, as a guide to repairs. The symptom table at the front of Troubleshooting lists the general categories of possible problems, and refers you to the appropriate Troubleshooting Table. The Tables tell you how to isolate and repair specific faults.

Sections 3 and 4, Take-Apart and Print Quality Adjustments, contain step-by-step instructions for the adjustments and replacements recommended by the Troubleshooting Tables. To find a particular procedure, just use the table of contents of the appropriate section.

Preventive Maintenance procedures (cleaning and lubrication) are given in section 5. Sections 6 and 7 contain technical procedures for the Forms Tractor and Sheet Feeder attachments for the DWP.

The Illustrated Parts List, contains exploded diagrams of the DWP modules, along with part numbers of the piece parts available from Apple. All these piece repairs are optional at Level One, but if you choose to replace broken or worn-out parts in your shop, this section will be helpful.

To begin learning how to operate the DWP, turn the page.

#### TOOLS AND MATERIALS NEEDED:

NOTE: There have been several revisions of the main PCB and a number of minor mechanical changes (size or type of screws, nuts, etc.) since the DWP was introduced. The tools recommended here should cover most DWPs currently in the field, but do not be surprised if you find variations from printer to printer.

Screwdrivers:

Small flatblade

Medium flatblade with narrow head

(magnetized) Medium Phillips Small Phillips

Nut drivers:

1/4 inch 5/16 inch

Wrenches:

5/8 inch open-end

1/4 inch box and open-end 11/32 inch box and open-end 5/16 inch box and open-end 3/16 inch box and open-end

Miscellaneous:

0.072 inch six-flute spline wrench

0.001 to .003 inch feeler gauges

Needlenose pliers Diagonal cutters Ruler (non-Metric) Crayon or felt marker

Special tools:

Apple Spring Scale and Combination

Gauge kit (P/N

Apple Combination Gauge

(Apple P/N

Torx Screwdriver\*

NOTE: This Torx driver, used for platen adjustments, is available at this time (10/83) only from the manufacturer and its representatives.

For information, current prices, and local distributors, write or call:

Mountz, Inc. 1080 North 11 St. San Jose, CA 95112 (408) 292-2214

Inquire about Platen Bit #T15 (P/N 000T15) and Non-Magnetic Aluminum Shank (P/N 38958-1).

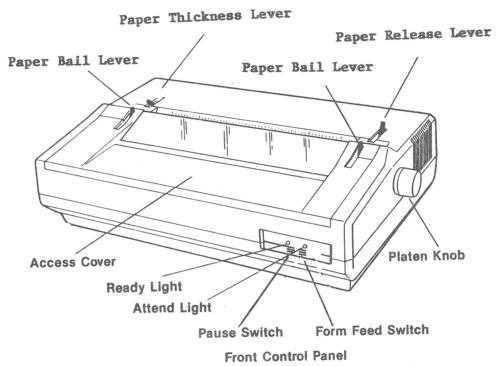
DWP Basics

## PARTS OF THE DAISY WHEEL PRINTER

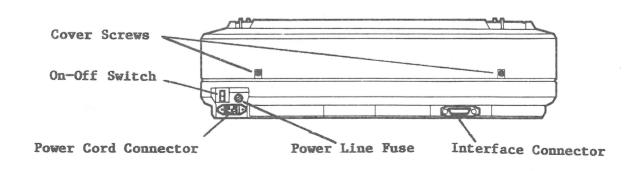
The diagrams on this and the following pages point out the major parts of the DWP and list their names. You can use these diagrams as a guide to the parts referred to in the other sections of this manual.

## 1. The DWP from the Outside

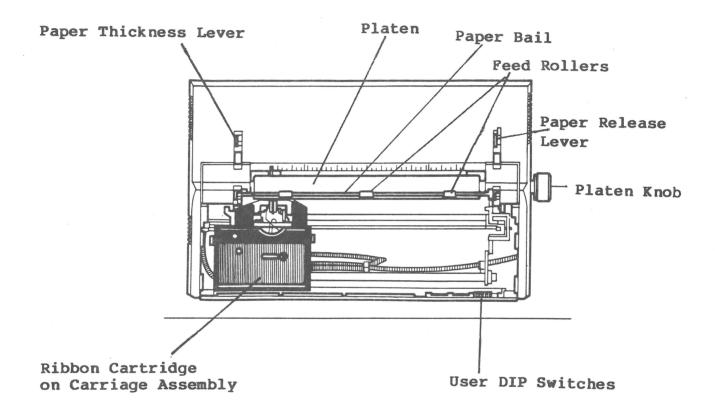




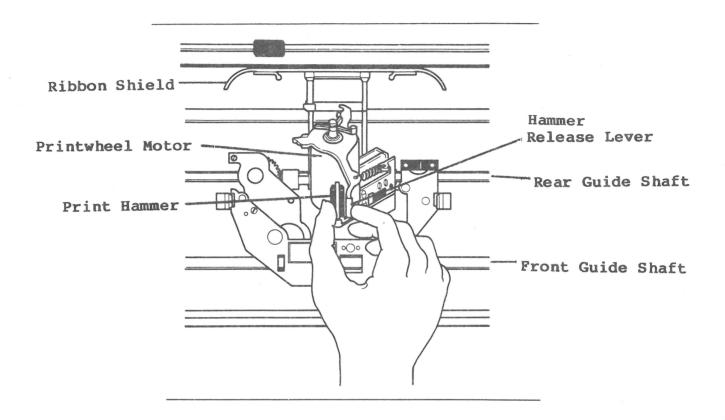
#### Back:



# 2. The DWP with the Access Panel Removed



3. The Carriage Assembly (with Ribbon Cartridge Removed)

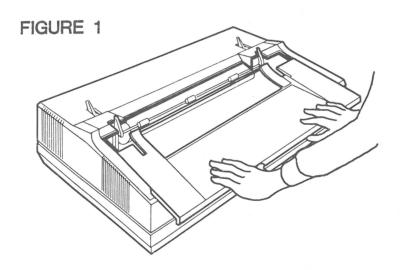


#### BASIC USER TASKS

#### Removing the Access Panel

This enables you to reach the printwheel, ribbon cartridge, and user switches.

- 1. Grasp the front lip of the panel and slide it forward (see Figure 1).
- 2. Tilt the front of the access panel down so you can see the small hinges on its back side. (With the panel in a vertical position, the hinges hold the panel to the front frame.)
- 3. To remove the access panel completely, lift it off its hinges.



#### Other User Tasks

Refer to the DWP User's Manual, Part 1, for instructions on removing and replacing the ribbon cartridge and printwheel, loading paper, and setting "top of form" position.

IF YOU ARE PERFORMING THESE PROCEDURES FOR PRACTICE, REMOVE AND REPLACE THE PRINTWHEEL AND RIBBON CARTRIDGE, LOAD PAPER, AND SET TOP OF FORM BEFORE PROCEEDING FURTHER.

#### Replacing the Access Panel

- Hang the panel, by its hook-shaped plastic hinges, from the front of the printer case.
- Push the panel forward so that it is level, and gently slide it toward the back of the printer until it is completely closed.

#### Checking Operation

When you turn the printer on, check the two status lights on the front panel. You should see one of the following four conditions:

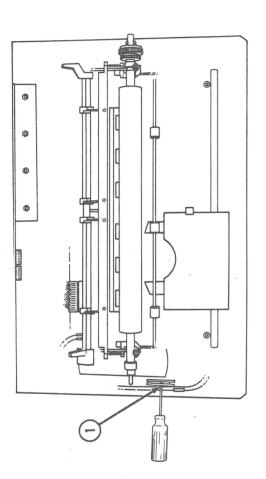
Ready light steady, attend light off: the printer is ready.

Ready light blinks, attend light off: the printer is in "pause" mode. Press the PAUSE switch and the ready light should become steady.

Ready light blinks, attend light on: normally indicates that access panel is off, or ribbon has run out, or no paper is installed in printer. Check for these conditions, correct if necessary, then press PAUSE. If lights remain in this condition, see Troubleshooting section.

Ready light off, attend light steady: the printer needs attention. Refer to the Troubleshooting section.

If no lights come on, see the Troubleshooting section.



## FIGURE 2

1 = CLOSED DIP Switch FRONT PANEL: 00100001 DIP Switch 2: 10010000 DIP Switch 1: 11100100

0 = 0PEN

Internal loop back test PASSED

|''#\$%&'()\*+,-,/0123456789:;<=>?@ABCDEFGHIJKLMNOPQRSTUVWXYZ[®]● abcdefghtjklmnopqrstuvwxyz\$¶†™`£ç{\}^~~"¡¿ÄöÜÄÑÆäöüäñēùèàì∂æıç߬¹"#\$%&'()\*+,-,/0123456789:;<=>?@ABCDEFGHIJKLMNOPQRSTUVWXYZ[®]● abcdefghtjklmnopqrstuvwxyz\$¶†™`£ç{\}^~~"¡¿ÄöÜÄÑÆäöüäñēùèàì∂æıç߬¹"#\$%&'()\*+,-,/0123456789:;<=>?@ABCDEFGHIJKLMNOPQRSTUVWXYZ[®]● abcdefghtjklmnopqrstuvwxyz\$¶†™`£ç{\}^~~"¡¿ÄöÜÄÑÆäöüäñēùèàì∂æıç߬¹"#\$%&'()\*+,-,/0123456789:;<=>?@ABCDEFGHIJKLMNOPQRSTUVWXYZ[®]● abcdefghtjklmnopqrstuvwxyz\$¶†™`£ç{\}^~~"¡¿ÄöÜÄÑÆäöüäñēùèàì∂æıç߬¹"#\$%&'()\*+,-,/0123456789:;<=>?@ABCDEFGHIJKLMNOPQRSTUVWXYZ[®]● abcdefghtjklmnopqrstuvwxyz\$¶†™`£ç{\}~~"¡¿ÄöÜÄÑÆäöüäñēùèàì∂æıç߬¹"#\$

# FIGURE 3

Software Version 1.6

#### PRINTER DIAGNOSTICS - SELF-TESTS

There are three self-tests (diagnostics) for the DWP: the Terminal Self-Test and Printer Self-Test are used to check mechanical functioning and print quality; the Terminal Self-Test with External Loop Back is used to check the electronics of the main printed circuit board.

NOTE -- Defeating the Top Cover Interlock Switch: If you have removed the cover for servicing, the self-tests will not normally run, because of an interlock switch at the front left side of the printer. But you can avoid replacing the cover if you defeat the top cover interlock switch as follows: Find the switch housing on the left side of the printer (Figure 2, #1). Push down on the switch lever inside the housing with a screwdriver, and then insert a small Phillips screwdriver through the hole in the switch housing, to hold the lever down.

WARNING: The interlock switch must <u>never</u> be left in the defeated mode. The switch should only be defeated by qualified service personnel during service procedures. DO NOT DEFEAT THE PURPOSE -- SAFETY -- OF THE INTERLOCK SWITCH.

#### Terminal Self-Test -- Print Quality Check

- Install paper, ll inches wide (normal paper installed sideways).
- 2. Inspect the printwheel and ribbon to make sure that they are not defective or worn.
- 3. Make sure that the paper thickness lever is in the full forward position (toward the operator).
- 4. Press and hold the PAUSE switch as you turn on the power.
  - NOTE: If the cover is off, observe the fan: make sure it is not obstructed by cables, etc.
- 5. Release the switch and the printer will print a short report of switch settings and internal tests, and then all characters on the print wheel. (See Figure 3.)
- 6. To stop the test you may:

turn power off, or

press and hold the PAUSE switch as the printer nears the end of a line of characters.

 $\left[\begin{array}{c} |1"\#\$\%\&"()*+,-./0123456789:;<=>?@ABCDEFGHIJKLMNOPQRSTUVWXYZ[@]@\_^abcdefghijklmnopqrstuvwxyz\$\P\uparrow^m \\ |1"\#\$\%\&"()*+,-./0123456789:;<=>?@ABCDEFGHIJKLMNOPQRSTUVWXYZ[@]@_^abcdefghijklmnopqrstuvwxyz\$\P\uparrow^m \\ |1"#\$\%\&"()*+,-./0123456789:;<=>?@ABCDEFGHIJKLMNOPQRSTUVWXYZ[@]@_^abcdefghijklmnopqrstuvwxyz\$\P\uparrow^m \\ |1"#\$\%\&"()*+,-./0123456789:;<=>?@ABCDEFGHIJKLMNOPQRSTUVWXYZ[@]@_^abcdefghijklmnopqrstuvwxyz\$\P\uparrow^m \\ |1"#$\%\&"()*+,-./0123456789:;<=>?@ABCDEFGHIJKLMNOPQRSTUVWXYZ[@]@_^abcdefghijklmnopqrstuvwxyz\$\P\uparrow^m \\ |1"#$\%\&"()*+,-./0123456789:;<=>?@ABCDEFGHIJKLMNOPQRSTUVWXYZ[@]@_^abcdefghijklmnopqrstuvwxyz\$\P\uparrow^m \\ |1"#$\%&"()*+,-./0123456789:;<=>?@ABCDEFGHIJKLMNOPQRSTUVWXYZ[@]@_^abcdefghijklmnopqrstuvwxyz\$\P\uparrow^m \\ |1"#$%&"()*+,-./0123456789:;<=>?@ABCDEFGHIJKLMNOPQRSTUVWXYZ[@]@_^abcdefghijklmnopqrstuvwxyz\$\P\uparrow^m \\ |"#$%&"()*+,-./0123456789:;<=>?@ABCDEFGHIJKLMNOPQRSTUVWXYZ[@]@_^abcdefghijklmnopqrstuvwxyz$\PT^m \\ |"#$%&"()*+,-./0123456789:;<=>?@ABCDEFGHIJKLMNOPQRSTUVWX$ 

#### FIGURE 4

- 7. Inspect the printed characters. All characters, numerals, and symbols should print with equal ink density on their left and right sides, and on top and bottom. The quality of characters should be identical on both sides of the page.
- 8. If the print quality does not meet these standards, see the **Troubleshooting** section of this manual.

#### Printer Self-Test

If you have trouble judging side-to-side print quality with the Terminal Self-Test, the Printer Self-Test prints a "barber pole" pattern (Figure 4) that enables you to see how each character prints at each location on the page. To run that test, follow the procedures for the Terminal Self-Test but press the Form Feed switch rather than the PAUSE switch.

#### External Loop Back Test

The external loop back test tests the communications circuitry on the main printed circuit board. If the test passes, the board is good; if not, replace the board.

- Prepare a Serial Loop-back Connector by jumpering (connecting) the following (female-side) sockets on a standard DB25 connector or a modem eliminator cable:
  - sockets 2 and 3, 4 and 5, 20 and 6, 23 and 8.
- 2. Connect the male side of the Serial Loop-back Connector to the jack on the back of the printer.
- 3. To start the test, press the PAUSE button while turning the printer on. To stop the test, press the PAUSE button to stop the printer; then press it again, and the printer will print the contents of its buffer and then stop.

This test produces the same printout as the Terminal Selftest, with two exceptions:

- a) The fourth line printed will indicate whether the external loop back test passed or failed.
- b) The last character printed will be the "status byte," a signal that the printer sends to the host computer (when connected). The status byte tells the host whether the printer is busy or idle, whether Automatic Line Feed is selected or not, etc. For more information, see the Daisy Wheel Printer User's Manual.

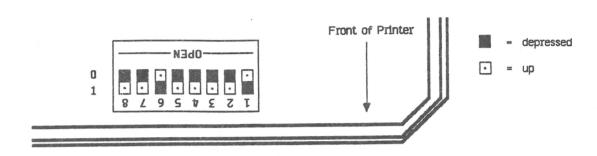


FIGURE 5

#### Front Panel DIP Switch Configuration

8	7	6	5	4	3	2	1
1: 8 lines per inch	1: Auto LF after CR	Form Length Type Pitch				Pitch	
per men	and or	0000: 3"	0011: 51/2"	0111: 81/2"	1001: 112/3"	00: 10	) срі
		0001: 31/2"	0100: 6"	1101: 9"	1010: 12"	*01: 12	? cpi
*0: 6 lines	*0: No auto LF after	0010: 4"	0101: 7"	1110: 10"	1011: 14"	10: 15	і срі
per inch	CR	1100: 5"	0110: 8"	*1000: 11"	1111: 16"	11: P\$	3

1 = CLOSED, 0 = OPEN, \* = factory set

### FIGURE 6

#### SETUP TASKS

#### Setting User Switches

To locate the user-accessible DIP switches, open the access panel and look at the right front corner of the printer. You will see a switch that appears to be installed backwards (see Figure 5). Don't change it: that's the way it should be.

The User DIP Switches control the following functions:

#### Switch # Function

- 8 Line Feed (6 or 8 lines per inch)
- 7 Automatic Linefeed after Carriage Return (on or off)
- 6-3 Form Length (from 3 to 16 inches)
- 2-1 Type Pitch (10, 12 or 15 characters per inch or proportional spacing).

The printer reads the switches only when it is first turned on; therefore, if you change the switch settings, you must turn the printer off and then on again to make the new settings operational. To change the settings, refer to the "Front Panel DIP Switch Configuration Chart" on the Reference Card in the <u>User's Manual</u> (or Figure 6), and note the following points:

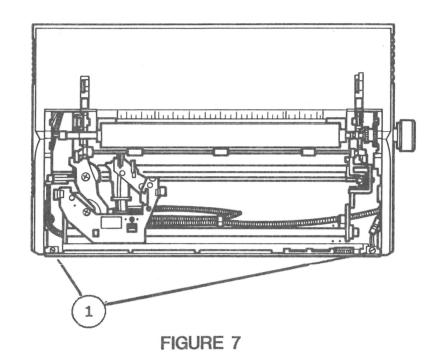
- 1. The switches can be depressed on either side with a screwdriver or paper clip. Depressing a switch on the side closest to "OPEN" sets a zero value, while the side having the switch numbers (1 through 8) sets a one value.
- 2. The switch numbers on the chart correspond to the numbers on the switch: both read left to right, even though the switch looks upside down.

For example, the factory settings of the switches are as follows:

V	alue	Setting
Line Feed (number of lines per inch)	6	0
Auto LF after carriage return	OFF	0
Form Length	11"	1000
Spacing (characters per inch, "type pitch")	12	01

The numerical setting of the switches is therefore 00100001, and the switch should appear as in Figure 5.

NOTE: Some software has commands that will override these switch settings; some does not. If a customer is having problems involving form feed length, type pitch, line feed size, or line feeding, check these switch settings.



#### REMOVE AND REPLACE TOP COVER

To perform Field Service Maintenance, you often need to remove the top cover. But, since the power supply board is not shielded, always make sure the power is off and the power cord is disconnected before you remove the top cover.

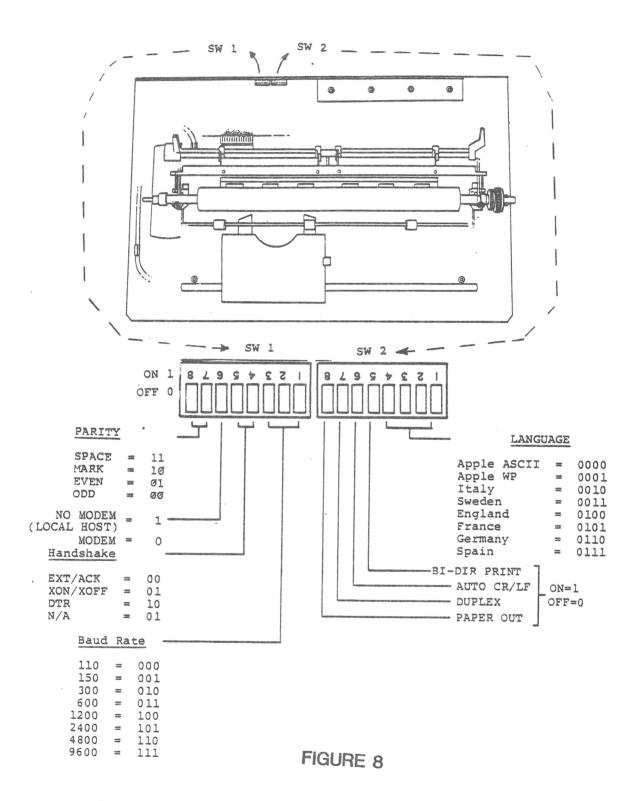
#### Remove:

- 1. Turn the printer off and disconnect the power cord.
  - WARNING: THE AC POWER CORD MUST BE DISCONNECTED BEFORE THE TOP COVER ASSEMBLY IS REMOVED. LETHAL VOLTAGES ARE PRESENT ON THE POWER SUPPLY PRINTED CIRCUIT BOARD.
- 2. Remove the access panel.
- 3. Remove paper.
- 4. If you had defeated the cover interlock switch with a paperclip or screwdriver, remove the paper clip or screwdriver.
- 5. Remove the two screws on the rear of the printer.
- 6. Loosen completely, but do not remove, the two screws near the front of the printer (one on either side) (Figure 7, #1).
- 7. Pull off the platen knob.
- 8. Lift the cover.

#### Replace:

NOTE: If you are doing these procedures for practice, do not replace the cover now, but go to the next procedure.

- 1. Lower the top cover into place.
- 2. Tighten the two front retaining screws. Replace and tighten the two rear screws.
- 3. Return the platen knob.
- 4. Return the access panel.



#### SETTING CONFIGURATION SWITCHES

The two configuration switches are located at the top of the main PCB (see Figure 8). The user is not supposed to set them: as part of an installation, you will set these switches according to the host system specifications and the needs of the customer. Normally the settings will not be changed unless there are technical changes to the host system.

To check the settings, run a Terminal Self-test. The printout will show the switch settings from left to right (switch 8 to switch 1), just as they appear on the physical DIP switches.

1 = ON = switch set toward rear of printer
0 = OFF= switch set toward front of printer

If the printout shows that the switches are set incorrectly, remove the top cover and reset them.

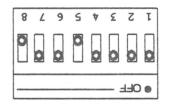
For an Apple II or Apple /// series computer, the settings
should be as follows:

DIP Switch 1: 11100100

8 L 9 S V E Z T

sw 1

DIP Switch 2: 10010000

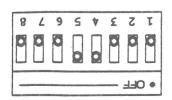


sw 2

Oindicates switch position

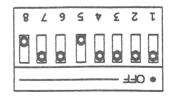
For an Apple Lisa computer, the settings should be as follows:

DIP Switch 1: 11100111



sw 1

DIP Switch 2: 10010000



sw 2

For other computers, you must check the computer's manuals to find the proper values for the functions listed below. Then use Figure 8 to set the switches to those values.

Swite	ch	Function	Value	Setting
swl:	8-7	Parity		
	6	Modem		
	5-4	Handshake		
	3-1	BAUD rate		
sw2:	8	Paper out		
	7	Duplex		
	6	Auto Linefeed/ Carriage Ret.		
	5	Bidirectional Print		
	4-1	Language		

#### REPACKING THE PRINTER FOR SHIPPING

The DWP should always be shipped in the same type of packing it came in. Keep a DWP box and packing materials on hand in case you need to send a whole printer to Apple for Level Two service. Follow the repacking instructions in Part 1 of the Apple Daisy Wheel Printer User's Manual (new version, to be published in early 1984), or reverse the unpacking instructions in the older Apple Letter Quality Printer Operator's Guide (P/N A2L-0066), pages 2-5. In particular, be sure to remove the printwheel, ribbon cartridge, and platen knob; to secure the carriage assembly in place; to tie down the paper bail; and to replace the metal shipping strap on the base of the printer.

#### THIS IS THE END OF DWP BASICS.

#### Apple Daisy Wheel Printer Technical Procedures

#### Section 2

#### Troubleshooting

#### Contents:

Troublesho	oting Tables2.2	
	and Diagrams for	
Fuse and	Module Replacement2.12	

NOTE: The Daisy Wheel Printer should be tested with the Apple II Peripherals Diskette. (See Multi-Product Diagnostics Technical Procedures, Section 1.)

#### Instructions:

Run a Terminal Self-Test (see Basics). Examine the printer for the symptoms listed below, and turn to the appropriate table for instructions. Step-by-step instructions for recommended replacements and adjustments can be found by consulting the tables of contents of the appropriate sections.

Symptom	Table	Page
Poor print quality	1	2.2
Prints scrambled text	2	2.4
Will not print		
Check indicator lamps:		
READY "ON" ATTEND "OFF" READY "BLINKS" ATTEND "ON" READY "BLINKS" ATTEND "OFF" READY "OFF" ATTEND "ON" READY "OFF" ATTEND "OFF"	3 4 5 6 7	2.5 2.5 2.6 2.6 2.7
Paper will not advance	8	2.10
Ribbon will not advance	9	2.11

#### Abbreviations

CA - Carriage Assembly

CM - Carriage Motor

PCB - Printed Circuit Board

PW - Printwheel

#### PRINT QUALITY

Except where noted, instructions for adjustments are to be found in Section 4, Print Quality Adjustments. Refer to the table of contents of the appropriate section to find the page locations of particular procedures.

#### Symptom

#### Adjustment

Tops of characters lost or light (evenly across the page)

- check ribbon support plate adjustment
- hammer angle (raise rear of hammer)
- platen height

Bottoms of characters lost or light (evenly across the page)

- move paper thickness
  lever forward
- check ribbon support plate adjustment
- hammer angle (lower rear of hammer)
- platen height
- platen depth

Print quality poor on one side of the page

- platen depth

Uneven letter spacing
 (Poor horizontal registration)

- drive belt tension
   (Sec. 3, Take-Apart)
- platen locator sleeve

Uneven line spacing (Poor vertical registration)

- If using a forms
  tractor, check:
  -installation
  -paper release
  lever position
  -timing belt (see
  Section 8, Forms
  Tractor)
- paper feed idler gear

Missing letters

check printwheel for missing spokeshammer penetration Light printing

- hammer armature front & rear stops

- hammer penetration
   replace ribbon
   replace print hammer assembly
- replace carriage assembly (Sec. 3, Take-Apart)

- Messy, over-inked printing
- Print quality varies from character to character,
- line to line
- Print quality varies from side to side of a single character

- rear stop
- hammer penetration
- replace ribbon
- clean ribbon shield fingers (Sec. 5, Preventive Maintenance)
- replace carriage assembly (Sec. 3, Take-Apart)
- replace ribbon
- clean print hammer (Sec. 5, Preventive Maintenance)
- replace print hammer

NOTE: Always run a Terminal Self-Test to recheck print quality. Most adjustments will need refinement to achieve optimum print quality.

#### PRINTS SCRAMBLED TEXT

Symptom: Prints scrambled text ("garbage").

Corrective Action: Run Terminal Self-Test.

Result 1: Printing is normal.

This indicates that the problem is in the host system, host system software, or communications between the host system and printer (User Switches, Configuration Switches).

#### Corrective Action:

- o Check host system software for correct driver, filter.
- o Check software settings for agreement with printwheel.
- o Check User Switch settings (see Basics Section).
- o Check Configuration Switch settings (see Basics Section).
- o Swap host system.

#### Result 2: Prints scrambled text.

Check the following and correct if necessary, rechecking after each step.

#### Corrective Action:

- o Check printwheel (bent spokes)
- o Check ribbon shield adjustment (may be rubbing against printwheel)
- o Replace Main PCB
- o Replace Carriage Assembly

Symptom: Will not print

Condition: READY lamp "ON"

ATTEND lamp "OFF"

This condition shows that the printer should be ready to print.

> Printwheel in place Ribbon cartridge OK (try a replacement) Configuration Switch settings (see Setup and Configuration section)

Disable Switches (HAMmer DIS, PW DIS, CA DIS) on main PCB (upper right corner) - should be off (set to right)

Host system and interface

Hammer OK (inspect; try a replacement)

If the DWP still won't print, follow initialization procedure in Table 7, Result 2.

#### TABLE 4

Symptom: Will not print

Condition: READY lamp "BLINKS"

ATTEND lamp "ON"

Corrective Check the following and correct if necessary,

Action: rechecking status condition:

Shipping straps removed? (see unpacking instructions) Access panel secure?

Top cover secure?

Out of paper?

Out of ribbon?

Cover Interlock Switch wires attached to wrong poles? (See "Replace Mechanical Assembly" in Take-Apart.)

If sheet feeder or forms tractor is attached, check out-of-paper switch and adjust if necessary (see Sheet Feeder and Forms Tractor sections).

If the DWP still won't print, follow initialization procedures in Table 7, Result 2.

Symptom:

Will not print

Condition:

READY lamp "BLINKS" ATTEND lamp "OFF"

Corrective Action:

- o Printer is in the "pause" mode. Press the "pause" switch for the READY condition.
- o Replace the main PCB
- o If the DWP still doesn't work, return it to Level Two.

#### TABLE 6

Symptom:

Will not print

Condition:

READY lamp "OFF" ATTEND lamp "ON" Short, audible alarm

#### Corrective

Action: Perform the following steps in order, rechecking for condition after each step:

- o Switch power "OFF", then "ON" again
- o Replace main PCB and recheck lamps
- o Replace carriage motor and CM encoder PCB
- o Replace carriage assembly and PW encoder PCB

Symptom:

Will not print

Condition:

READY lamp "OFF" ATTEND lamp "OFF"

Corrective

Action:

Listen to hear if fan is operating.

Result 1: Fan not operating

#### Corrective

Action: Perform the following steps in order, rechecking for condition after each step:

- o Check that AC power cord is plugged in.
- o Switch power "OFF", then "ON".
- o Check AC line fuse (see Diagram, p. 2.12).
- o Replace AC power cord.
- o Check power supply PCB fuse (F1) (see Diagram, p. 2.12).
- o Replace power supply PCB.
- o Replace power switch.

#### Result 2: Fan operating

#### Corrective

Action: Check printer initialization as follows:

- 1. Switch power off.
- 2. Remove top cover and defeat interlock.
- 3. Push carriage assembly to center of printer.
- 4. Put slack in ribbon cartridge.
- 5. Rotate printwheel.

#### CONTINUED ON NEXT PAGE

- 6. Restore power and watch for one of the following four conditions:
  - a. Printwheel rotates if not, proceed to New Symptom A.
  - b. Carriage moves quickly to left side-frame, then slightly right to establish column zero - if not, proceed to New Symptom B.
  - c. The ribbon advances slightly to take up slack if not, proceed to New Symptom C.
  - d. If no movement of any carriage assembly component, proceed to New Symptom D.

If carriage, ribbon and printwheel move correctly but printer still will not print, replace main PCB.

New Symptom: A - No rotation of printwheel

#### Corrective

Action: Perform each of the following steps in order, rechecking for condition after each step:

- o Check PW Disable Switch (Main PCB, upper right corner) - it should be off (set to the right)
- o Check P-9 connection on main PCB
- o Check PW encoder PCB connection
- o Replace PW pico fuse F-2 on main PCB (see Diagram, p. 2.12)
- o Replace main PCB
- o Replace carriage assembly and PW encoder PCB

New Symptom: B - No movement of carriage assembly

#### Corrective

Action: Perform each of the following steps in order, rechecking for condition after each step:

o Check CA Disable Switch (main PCB, upper right corner)

- o Check P-7 connector on main PCB
- o Check CM encoder PCB connections
- o Replace pico fuse F-l on main PCB (see Diagram, p. 2.12)
- o Replace main PCB
- o Replace carriage drive motor and CM encoder PCB

New Symptom: C - No movement of ribbon

#### Corrective

Action: Perform each of the following steps in order, rechecking for condition after each step:

- o Check the two connectors under the ribbon cartridge on the ribbon support plate for tight connection
- o Replace ribbon cartridge with known good one and recheck
- o Check connector P-9 on main PCB
- o Replace pico fuse F-3 (see Diagram, p. 2.12)
- o Replace main PCB
- o Replace carriage assembly and PW encoder PCB

New Symptom: D - No movement of any carriage assembly components

#### Corrective

Action: Perform each of the following steps in order, rechecking for condition after each step:

- o Check connector P-8 on main PCB and P-5 on power supply PCB
- o Replace Fl and F2 on power supply PCB (see Diagram, p. 2.12)
- o Replace the main PCB
- o Replace the power supply PCB

Symptom: Paper will not advance

Condition: READY lamp "ON"

ATTEND lamp "OFF"

Carriage assembly operational

Corrective Perform the following in order, rechecking for condition after each step:

- o Set user switches correctly.
- o Check connector P-10 on main PCB.
- o Check paper feed idler gear adjustment.
- o Perform Terminal Self-Test.
  - If Pass, problem is host or interface.
  - If Fail, replace pico fuse F-3 on main PCB (see Diagram, p. 2.12).
- o Replace the main PCB.

Symptom: Paper advances, but poor vertical registration

Corrective Perform the following in order, rechecking for
Action: condition after each step:

- o If using a forms tractor, check installation, paper release lever position, and timing belt tension (see Forms Tractor Technical Procedures).
- o Adjust the paper feed idler gear.

Symptom: Paper advances backwards or with chatter

Corrective Perform the following in order, rechecking for condition after each step:

- o Check the paper feed idler gear for chatter as gears mesh.
- o Check P-10 on the main PCB; it could be backwards or seated on the wrong pins.
- o Replace the main PCB.

Symptom:

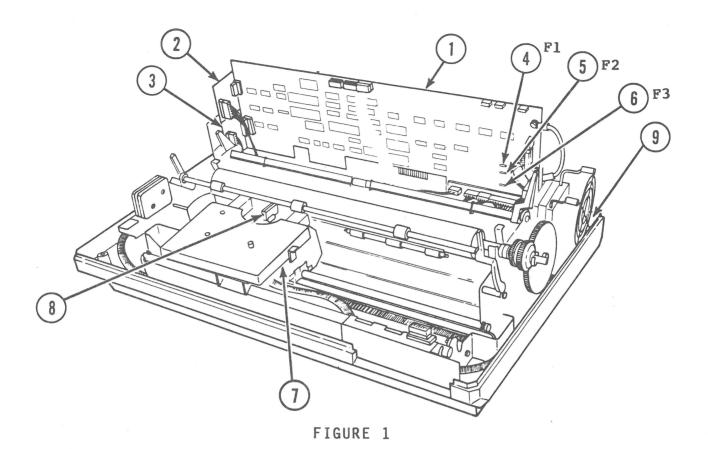
Ribbon will not advance

Printwheel motor and carriage drive motor

operational

## Corrective Action:

- o Remove ribbon and initialize to see if ribbon motor is operational.
- o If operational, replace ribbon cartridge and perform Terminal Self-test
- o If non-operational, perform the following, rechecking condition after each step:
  - Replace pico fuse F-3 on the main PCB (see Diagram, p. 2.12)
  - Replace the carriage assembly.



4 F2 1 2 3 F1

FIGURE 2 5

DWP Troubleshooting

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page 2.12

#### PARTS LIST AND DIAGRAMS FOR MODULE AND FUSE REPLACEMENT

For a complete listing of replaceable parts, see **Section 8**, **Illustrated Parts List**. The parts listed below are the recommended module replacements for Level One service. The other parts listed in the **Illustrated Parts List** are optional replacements.

#### **Fuses**

AC Line Fuse	***	5 amp (Figure 2, #2)
Power Supply PCB Fuses		F1, 5 amp or, in Europe, JP1, 3 amp (Figure 2, #3) F2, 5 amp (Figure 2, #4)
Main PCB Pico Fuses	-	F1, 4 amp (Figure 1, #4) F2, 2 amp (Figure 1, #5) F3, 5 amp (Figure 1, #6)

#### Mechanical Components

Figure 1: everything except printed circuit boards and outer case
Figure 1, #7
Figure 1, #8
Figure 2, #7
Figure 2, #2
Figure 2, #5
Figure 2, #6

#### Printed Circuit Boards

Main PCB	Figure	1,	#1
Power Supply PCB	Figure	2,	#1
Carriage Motor encoder PCB (replaced with Carriage Motor)	Figure	1,	#2
Printwheel encoder PCB (replaced with Carriage Assembly)	Figure	1,	#3

#### Apple Daisy Wheel Printer Technical Procedures

#### Section 3

#### Take-Apart

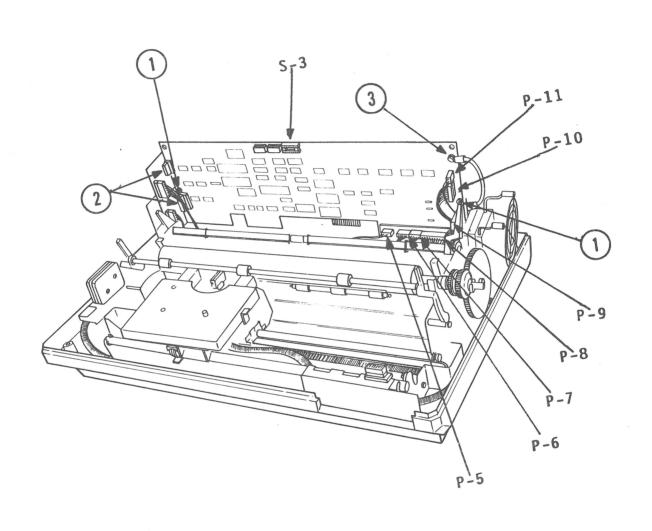
Contents:
IMPORTANT: READ THIS FIRST
Procedures:
1 - Remove Main PCB
2 - Remove/Replace Power Supply Switch3.9
3 - Remove Mechanical Assembly3.11
4 - Remove/Replace Power Supply PCB3.13
5 - Remove/Replace Carriage Drive Motor3.15
6 - Remove/Replace Carriage Assembly3.19
7 - Adjust Drive Belt Tension3.27
7a- Horizontal Registration Test3.28
8 - Replace Mechanical Assembly3.31
9 - Replace Main PCB3.33
10 - Adjust Ribbon Shield3.34
11 - Final Check

NOTE: If you are using this manual for training, perform only the steps marked with an asterisk (\*). By following the marked steps in order, you will completely disassemble and then reassemble the printer with a minimum of duplicated actions.

IMPORTANT: READ THIS FIRST

In all the procedures that follow, be especially careful of the following:

- 1. DO NOT OVERTIGHTEN SCREWS, NUTS, ETC.: To avoid stripping and breaking parts of the printer, be sure to tighten screws, etc., only as much as needed to hold the adjustment. If you are tempted to give a screw an extra turn "just to make sure it's tight enough," resist the temptation!
- 2. Make certain you recover all screws, nuts, etc., before turning the printer on again. Any foreign metal object dropped into the printer could cause a short circuit and a lot of damage.
- 3. Always turn off the power and disconnect the AC power cord before working inside the printer. The Power Supply Printed Circuit Board, located beneath the mechanical assembly, carries a lethal voltage when the power is on.



page 3.4

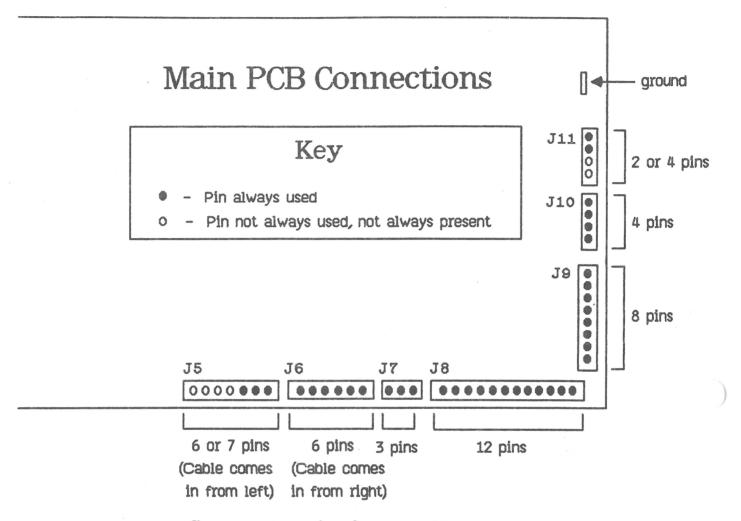
#### 1 - REMOVE MAIN PCB

Tools required: Medium flatblade screwdriver Felt pen or marker

There are four printed circuit boards in the Apple DWP. The main PCB is the large board at the rear of the printer. (Two small encoder PCBs plug into the left side of the main PCB; they control the printwheel motor and the carriage drive motor. The power supply PCB is beneath the mechanical assembly.)

- \*1. Disconnect the AC power cord.
- \*2. Remove the top cover.
- \*3. Unplug the ribbon cable from jack S-3 (top center of PCB).
- \*4. Disconnect the ground wire from the upper right side of the PCB (see Figure 1, #3).
- \*5. The main PC board is held by two plastic fasteners, one at each top corner. Pull one fastener away from the board and hold it as you push the board away from the fastener with your other hand; repeat for the other side.
- \*6. There are two mounting holes midway between the top and bottom of the board. Lift the board halfway up and install it on the fasteners using these mid-point holes. (See Figure 1, #1.) If you have trouble raising the PCB, try to free it by pushing with your finger through the RS232 slot on the lower left of the rear panel.
- \*7. Unplug the two encoder PCBs from the extreme left side of the main PCB. (See Figure 1, #2.)
- \*8. Number the cable connectors on the right side of the PCB with the felt pen, according to the P-numbers on Figure 1, so that you will be able to reinstall them correctly.

#### CONTINUED ON NEXT PAGE



### **Connector Assignments**

J5 Cover Interlock,
Out of paper detect,
Forms tractor/sheet feeder
connection

J6 Operator Panel J7 Carriage Assembly J8 DC Power

Motor

J9 Printwheel Motor, Ribbon feed motor, Hammer coil J10 Paper Feed Motor J11 Hammer Resistor

FIGURE 2

- \*9. Mark any empty pins on the jacks (see Figure 2).
  - NOTE: The cable connections on the main PCB have gone through many revisions, and not all are documented here; so it is important to mark the jacks and connectors before disconnecting anything.
- \*10. Then remove all the connectors (Pll through P5) from the jacks, being careful to pull only on the connectors, not on the wires. (Pulling on the wires can cause bad connections to develop, which creates intermittent problems that are very difficult to troubleshoot.)
- \*11. Release the main PCB from the fasteners and remove it from the printer.

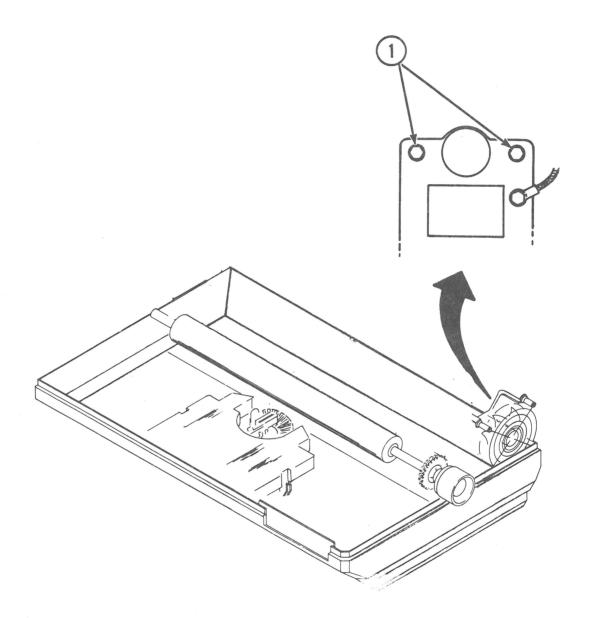


FIGURE 3

#### 2 - REMOVE AND INSTALL POWER SUPPLY SWITCH

Tools required: 1/4 or 5/16 inch nut driver

1/4 or 5/16 inch wrench

Needlenose pliers Diagonal cutters

Medium flatblade screwdriver

Felt pen or marker

#### To Remove:

1. Disconnect the power cord and remove the main PCB (see Procedure 1).

- \*2. Using a nut driver and a wrench, remove the two screws that hold the fan to its mounting bracket (see Figure 3, #1).
- \*3. Carefully lift the fan out of the printer as far as its wires permit, keeping hold of both the front and back of the fan, and return the screws to the fan to prevent it from coming apart.

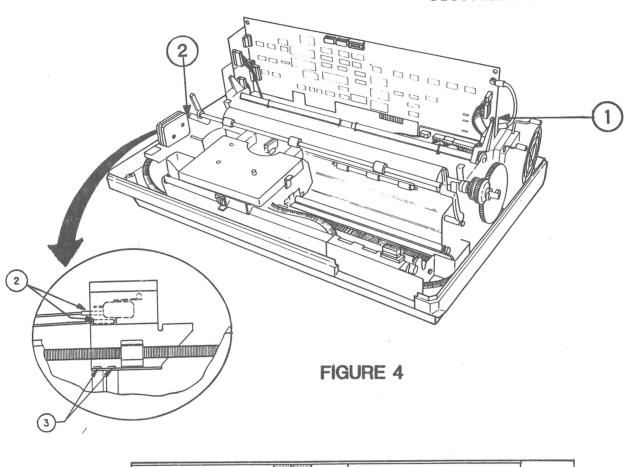
NOTE: If the fan wires are very short, unplug them from their jack on the Power Supply PCB (bottom of printer). Then lift the fan out of the way.

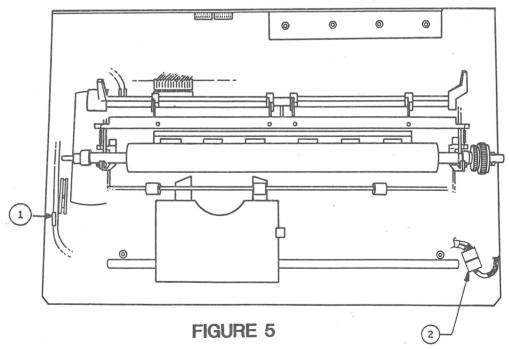
- \*4. Mark or note the position of the four wires to the power switch; then slide the spade connectors off the power switch. (You may need to use long nose pliers to remove the spade connectors.)
- \*5. Depress the spring lever (cut the tie wrap if present) at the top of the power switch and push the switch out of the printer.

#### To Install:

- \*1. Put the switch in place but leave it loose.
- \*2. Connect the wires (top wires come from Power Supply PCB; blue wires are toward outside of printer [right side, as you look from the front]).
- \*3. Push the switch into its socket so that it snaps into place.
- \*4. Install the fan. NOTE: Tighten the screws evenly and check that the fan turns freely. If it does not, the screws are too tight or too loose.

Procedure 3





IF PRACTICING THIS PROCEDURE FOR TRAINING, SKIP STEPS 5 AND 6 AND GO ON TO PROCEDURE 3.

- 5. Replace the main PCB (see Procedure 9).
- 6. Perform Final Check (see Procedure 11).

#### 3 - REMOVE MECHANICAL ASSEMBLY

Tools required: Medium flatblade screwdriver Needlenose pliers Felt pen or marker

By mechanical assembly we mean the entire printer mechanism, except for the printed circuit boards, the printer case and the fan.

- 1. Disconnect the power cord and remove the main PCB (see Procedure 1).
- \*2. Disconnect the ground wire from the back plate of the case (see Figure 4, #1).
- \*3. Hold the mechanical assembly in place as you remove the four retaining screws on the underside of the printer.
- \*4. Remove the two spade connectors from the cover interlock switch (Figure 4 and detail, #2), using needlenose pliers or a flatblade screwdriver if necessary.
  - NOTE: These cables need not be marked: they are interchangeable. But they must be installed on the correct poles (the lower two poles) of the switch.
- \*5. Release the harness cable (large silver coil-wrapped cable) from its clamp near the left side-frame. (See Figure 5, #1; this clamp is not present on some printers, however.)
- \*6. Unplug the harness cable connector from its mate on the right front side of the assembly (see Figure 5, #2).
- \*7. (Optional but recommended) Remove the two screws that hold the cover interlock switch to the printer case and remove the switch (see Figure 4, detail, #3). (This is not possible on some models of the DWP.)
- \*8. Lift the mechanical assembly up and out of the printer case, being careful of the cables on the right side of the frame.

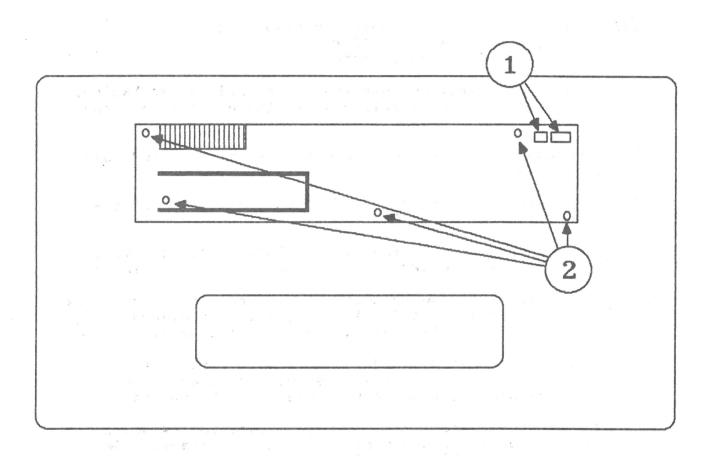


FIGURE 6 

### 4 - REMOVE AND REPLACE POWER SUPPLY PCB

Tools required: Medium flatblade screwdriver

Needlenose pliers Felt pen or marker

#### To Remove:

WARNING: ALWAYS DISCONNECT THE AC POWER CORD BEFORE TOUCHING THE POWER SUPPLY PCB. LETHAL VOLTAGE IS PRESENT WHEN THE AC POWER CORD IS CONNECTED.

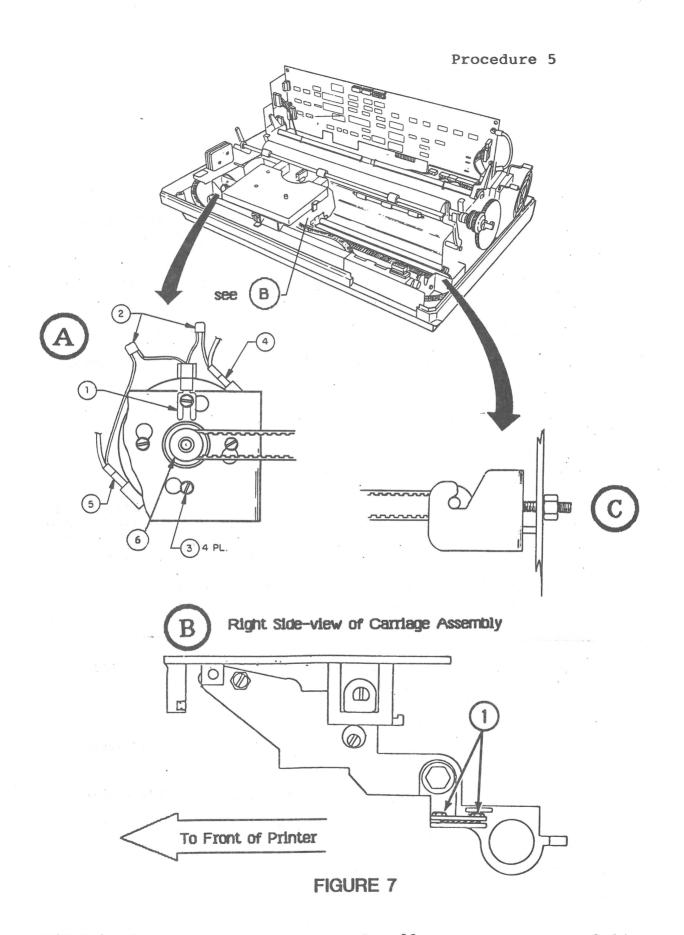
- 1. Disconnect the power cord and remove the main PCB (see Procedure 1).
- 2. Remove the mechanical assembly (see Procedure 3).
- \*3. Disconnect P-1 and P-2 from the right side of the power supply PCB (see Figure 6, #1).
- \*4. Five white plastic peg fasteners hold the board down on early versions; on later printers, some of the peg fasteners are replaced by screws. If screws are present, remove them first. (See Figure 6, #2, for positions.)
- \*5. Free the board from the plastic fasteners by depressing the lip of a fastener (use small screwdriver, needlenose pliers or fingers), then lifting the board slightly off the fastener, and repeating until the board is free.
- \*6. Lift the power supply PCB from the frame.

## To Replace:

- \*1. Install the power supply PCB on its fasteners. Push down to lock.
- \*2. Replace screws (if there were screws).
- \*3. Attach connectors P-1 and P-2 (on right side of power supply PCB) (see Figure 6, #1)

# IF PRACTICING THIS PROCEDURE FOR TRAINING, SKIP STEPS 4-6.

- 4. Reinstall the mechanical assembly (see Procedure 8).
- 5. Reinstall the main PCB (see Procedure 9).
- 6. Perform Final Check (see Procedure 11).



# 5 - REMOVE AND REPLACE CARRIAGE DRIVE MOTOR

Tools required: Medium flatblade screwdriver

Needlenose pliers Felt pen or marker

Wrenches: 11/32, 3/16, 1/4 inch

Diagonal cutters

Apple Combination Gauge and Spring gauge

Ruler

### To Remove:

1. Disconnect the power cord and remove the main PCB (see Procedure 1).

- 2. Remove the mechanical assembly (see Procedure 3).
- \*3. Remove the ribbon cartridge and printwheel (see **User's** Manual).
- \*4. Push the print hammer assembly back into normal printing position.
- \*5. Loosen the drive belt by loosening the adjustment nut on the right side (see Figure 7C) with 11/32 inch wrench. (Do not remove nut from screw.)
- \*6. Remove the drive belt from the right side of the carriage assembly by loosening the two screws holding the belt (see Figure 7B, #1) with a 3/16 inch wrench or small flatblade screwdriver, and then pulling the belt out of its bracket.
- \*7. Loosen the belt around the motor pulley (Figure 7A, #6).
- \*8. CAUTION: Two small capacitors (Figure 7A, #2) are mounted between the ground wire connector (Figure 7A, #1) and the two spade connectors on the carriage motor. In the following step, AVOID STRAIN ON THESE WIRES: it may break the capacitors.
  - With a screwdriver or 1/4 inch wrench, loosen the top mounting screw and remove the ground wire connector (Figure 7A, #1).
- \*9. With a screwdriver and/or a 1/4 inch wrench, loosen the top mounting screw and remove the ground wire connector.
- \*10. Detach the two spade connectors from the brush mountings on the motor (Figure 7A, #4 and 5). It's easiest to pry them off with a screwdriver, using a twisting motion.

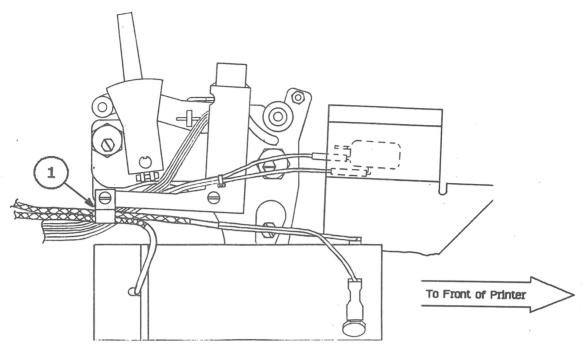


FIGURE 8

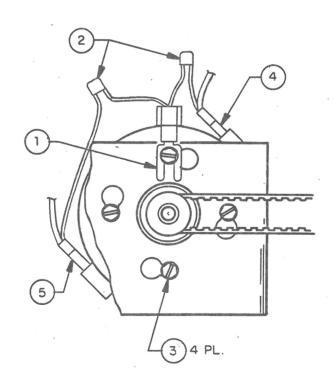


FIGURE 9

- \*11. On some models, the motor cables are held to the mechanical assembly with a clamp (Figure 8, #1). If yours has this feature, unhook the cables from the clamp.
- \*12. If the motor cable is clamped to the back shaft of the mechanical assembly with cable ties, cut the ties to free the cable.
- \*13. With a screwdriver and/or a 1/4 inch wrench, remove the four mounting screws holding the carriage drive motor (see Figure 9, #3).
- \*14. Remove the carriage drive motor and its encoder PCB.

NOTE: The carriage motor and encoder PCB are always replaced as a unit. Each encoder PCB is matched to a particular motor by the factory.

### To Install New Motor:

- \*1. Place the carriage drive motor against its bracket on the mechanical assembly (red pole is at 1 o'clock position).
- \*2. Reposition the ground wire at the top mounting hole of the motor and insert the screw.
- \*3. Replace and tighten the other three motor-mounting screws. (HINT: Start with the screw at 3 o'clock position and go clockwise. To position the screw at 9 o'clock position, hold it in the box end of the 1/4 inch wrench and lower it into place. Then you can start it with the screwdriver.)
- \*4. Attach the two spade connectors (black wire to black connector and red to red).
- \*5. If the motor cables were clamped to the mechanical assembly, replace them in the clamp.

# IF YOU ARE USING THIS PROCEDURE FOR TRAINING, SKIP TO PROCEDURE 6.

- 6. Reroute the drive belt around the motor pulley (see Figure 9). (Make sure that the smooth side of the belt is on the outside and that the belt goes through the slot in the chassis.)
- 7. Reinsert the drive belt into its bracket on the right side of the carriage assembly as far as it can go, and tighten the two screws that hold it there.

- 8. Adjust the drive belt tension (see Procedure 7).
- 9. CAUTION: In this step, watch the cables on the right side of the printer as you lower the mechanical assembly into place. The drive belt adjustment screw tends to catch on these cables and can damage them.

Reinstall the mechanical assembly (see Procedure 8).

- 10. Reinstall the main PCB, but leave it in service position (see Procedure 9).
- 11. Plug the new encoder PCB into the main PCB.
- 12. Attach the motor cable to the new encoder PCB.
- 13. Perform Horizontal Registration Test (see Procedure 7a, below) and fine-tune belt tension.
- 14. Return the main PCB to operating position (see Procedure 9, steps 5 8).
- 15. Perform a Final Check (see Procedure 11).
- 16. Replace and fasten the top cover and access panel.

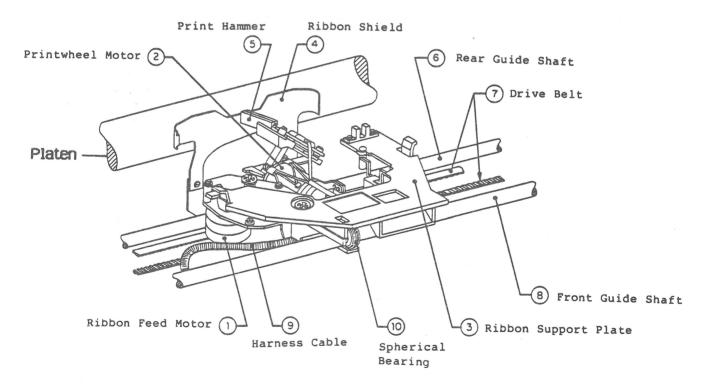


FIGURE 10 - The Carriage Assembly

### 6 - REMOVE AND REPLACE CARRIAGE ASSEMBLY

Tools required: Medium flatblade screwdriver

Needlenose pliers Felt pen or marker

Wrenches: 3/16, 1/4, and 11/32 inch

Apple combination gauge

Spring gauge

Ruler

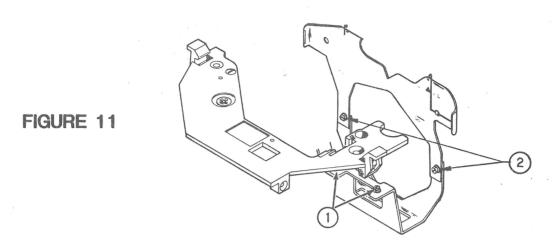
Figure 10 shows the basic components of the carriage assembly: the ribbon support plate (#3), ribbon feed motor (#1), printwheel motor (#2), and print hammer assembly (#5). The print hammer can be replaced by itself (see **Print Quality Adjustments**). If any of the other three parts is faulty, replace the entire carriage assembly.

NOTE: These procedures assume that you will remove the mechanical assembly before removing the carriage assembly. The carriage assembly can be removed and replaced while the mechanical assembly is in the printer, but the procedure is more awkward and difficult.

### To Remove:

- 1. Disconnect the power cord.
- 2. Remove the main PCB (see Procedure 1).
- 3. Remove the mechanical assembly (see Procedure 3).
- 4. Remove the ribbon and printwheel.
- \*5. So that you will know how the new carriage assembly should look when installed, push the printwheel assembly back into normal position and move the carriage assembly back and forth in the printer to see how it looks and feels, how the harness cable (Figure 10, #9) is routed, and where the three harness cable clamps are placed on the base plate.
- \*6. The harness cable is held to the base plate by three clamps (left, right and center). Mark the position of the three clamps on the base plate.
- \*7. Loosen the clamps and free the cable, but leave the clamps attached to the base plate.

Procedure 6



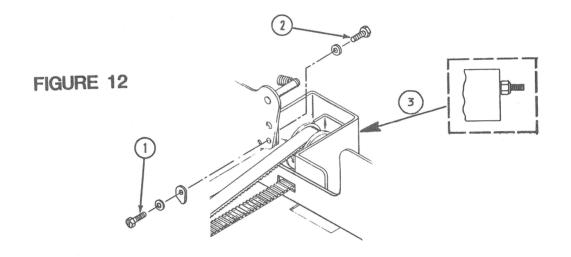
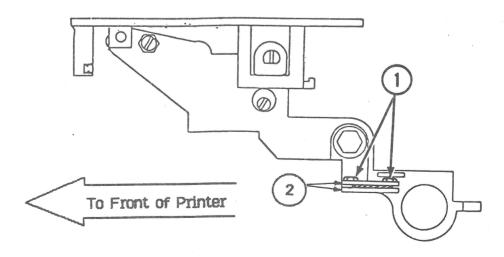


FIGURE 13 Right Side-view of Carriage Assembly



\*8. Unplug the encoder PCB from the harness cable and lay it aside.

NOTE: The encoder PCB, which controls the printwheel motor, is "tuned" to this particular carriage assembly at the factory. Then you install a new carriage assembly, you must also install the new encoder PCB supplied with it.

- \*9. Remove the ribbon shield (Figure 10, #4) as follows:
  - a) Tilt back the print hammer assembly.
  - b) Remove the two screws that hold the ribbon shield to the carriage assembly (Figure 11, #1).
  - c) Slide the ribbon shield to one side and lift it out.

NOTE: The printwheel motor is magnetized and may capture the loose screws. If one of the screws is missing, look there first.

- 10. Loosen the drive belt by loosening the adjusting nut on the right side as far as you can (Figure 12, #3). (Use 11/32 inch wrench.)
- 11. The drive belt is held to the right side of the carriage assembly by two screws (see Figure 13, #1). Loosen but do not remove the screws, and pull the belt out of the bracket (Figure 13, #2).
- \*12. The carriage rides on the rear guide shaft (Figure 10, #6). On each side of the rear shaft is a small locking plate that holds the shaft in place (see Figure 12, #1). Mark or note the position of the two locking plates, and then loosen (but do not remove) them.
- \*13. Use a 1/4 inch box wrench to remove the outer screw on the right side of the frame (see Figure 12, #2).
- \*14. Slide the carriage assembly all the way to the left.
- \*15. Remove the rear shaft as follows:
  - a) Lift the right side of the shaft free of its mounting slot (you may have to push the pulley out of the way).
  - b) Then pull the shaft out of the assembly completely. If you have trouble, make sure the carriage assembly is as far left as possible.

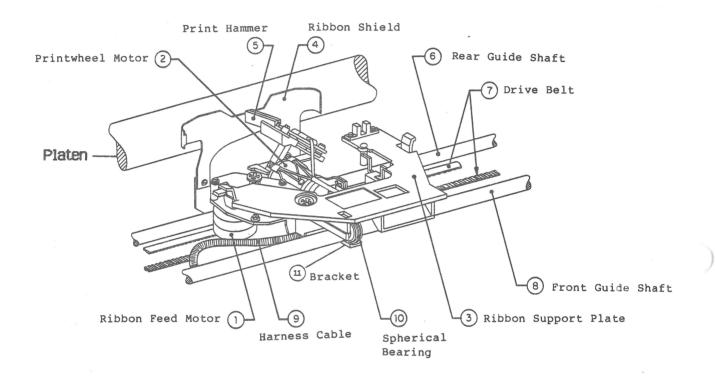


FIGURE 14

- \*16. Pull the two ends of the harness cable through the holes in the mechanical assembly.
- \*17. Pull the drive belt out through the hole in the left side of the frame, so that it is hanging freely from the left side of the carriage assembly.
- \*18. Free the carriage assembly from the front guide rail shaft by lifting it up and toward the platen. (CAUTION: Don't force it! Notice the plastic bracket under the front shaft (Figure 14, #11), which may catch on the shaft if you're not careful.)
- \*19. Remove the carriage assembly from the printer.
- 20. With a 3/16 inch wrench, loosen the two screws holding the drive belt to the left side of the carriage assembly, and free the belt.

# To Install New Carriage Assembly:

- 1. Insert the drive belt into the left side of the new carriage assembly and tighten the two screws. Make sure the cleated side of the belt is facing DOWN.
  - CAUTION: Don't overtighten the screws; make sure the belt fits into the cleats of the little bracket on the carriage assembly.
- \*2. Fit the carriage assembly onto the spherical bearing on the front shaft (see Figure 14, #10).
- \*3. Route the harness cables so that the cables will cross under the carriage assembly, and push the two connectors through the holes in the mechanical assembly.
- \*4. Slide the carriage assembly as far left as possible.
- \*5. Insert the rear shaft through the carriage assembly and into the left side hole.
- \*6. Push the right side of the shaft into its slot (a pushing/rolling motion works best).
- \*7. Notice the C-clamps at the right end of the rear shaft.

  Make sure that the open part of the C-clamps points

  down.

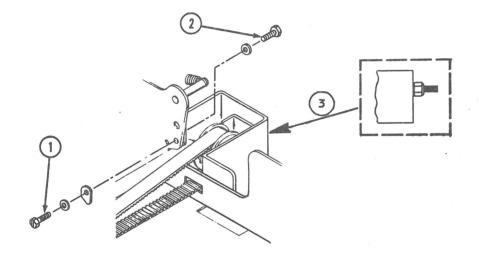


FIGURE 15

- \*8. Replace the outer screw and washer (Figure 15, #2). DO NOT OVERTIGHTEN!
- \*9. Reposition the two rear shaft locking plates, making sure they butt against the shaft, and tighten the screws (see Figure 15, #1).
- \*10. Reroute the drive belt: over the pulley on the left side, through the slot in the left side of the frame, across to the right side, through the slot, and around the right pulley (see Figure 15). (Reinstall the right side pulley if it has come out of its slot, making sure that the pulley has a flat brown thrust washer on either side.)
- \*11. Insert the right side of the drive belt into the carriage assembly as far as it will go, and tighten the two screws.
- \*12. Tighten the drive belt adjusting nut (Figure 15, #3) to take up some of the slack, but do not make the belt taut: if it is taut, the carriage assembly will not
- \*13. Reroute the harness cable under all three clamps on the base plate, and screw down the clamps.
- \*14. Tilt the printwheel motor assembly back to normal printing position and run the carriage assembly back and forth to check for free run and noninterference with the harness cable. Adjust or reroute the cable if necessary.
- \*15. Reinstall the ribbon shield as follows:
  - a) Tilt the print hammer assembly away from the platen.
  - b) Slide the ribbon shield into place.
  - c) Reinstall the two screws but leave them loose.
- \*16. Adjust the ribbon shield depth (see Procedure 10: Depth only, p. 4.34).
- \*17. Reinstall the printwheel and ribbon.
- \*18. Adjust the drive belt tension (see Procedure 7).
- \*19. Reinstall the mechanical assembly (see Procedure 8).

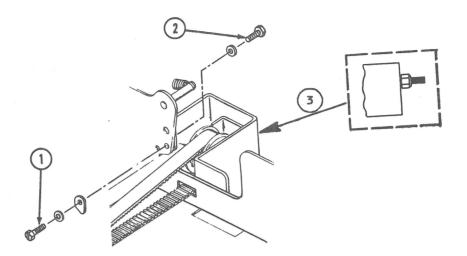
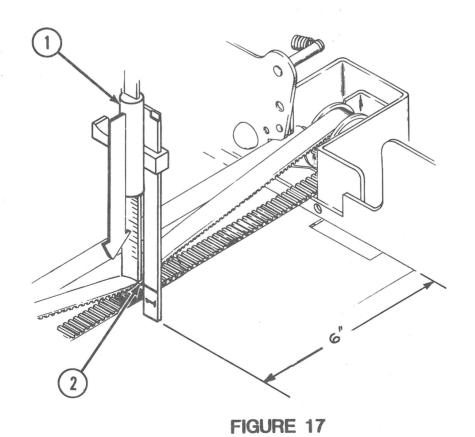


FIGURE 16



rev. Dec 83

- \*20. Put the main PCB in service position and reinstall the wires (see Procedure 9, steps 1-4). Make sure to install the **new** encoder PCB that comes with the new carriage assembly.
- \*21. Defeat the cover interlock switch (see **Basics**) and perform the Terminal Self-Test to verify that the new carriage assembly works. If you hear scraping, check the harness cable: if the cable loops near the carriage are too large, they will interfere with carriage motion.
- \*22. If the carriage assembly works properly, lower the main PCB to operating position (see Procedure 9, steps 5-8.)
  - 23. Perform the Horizontal Registration Test (see Procedure 7a, below) and fine-tune the belt tension.
  - 24. Perform a Final Check (see Procedure 11).

### 7 - ADJUST DRIVE BELT TENSION

Tools Required: 11/32 inch wrench, Apple combination gauge, Spring gauge, Ruler

- \*1. Turn the drive belt adjusting nut (Figure 16, #3) clockwise until the belt is fairly taut.
- \*2. Move the carriage assembly to the far left side of the frame.
- \*3. Use a pen to mark a line on the belt six inches from the right side of the frame (see Figure 17).
- \*4. At this same point on the drive belt, place the combination gauge so that the side marked "1" is resting on the base plate of the chassis (see Figure 17).
- \*5. Use a spring scale to push directly down on the marked point on the drive belt with one pound of force (see Figure 17, #1). With the combination gauge resting on the bottom structure, the lowest scribe line on the gauge should be even with the top of the belt (see Figure 17, #2).
- \*6. If the drive belt is too loose, turn the adjusting nut clockwise; if too tight, turn the nut counterclockwise (see Figure 16, #3).

- \*7. After altering the drive belt tension, move the carriage assembly back and forth several times; then check again for correct tension and adjust if necessary (Steps 2-6).
  - 8. To fine-tune the drive belt tension (and therefore the horizontal registration), perform the Horizontal Registration Test below and tweak the adjusting nut until results are optimum. This is particularly important if the DWP is being used for graphics, as it might be in a Lisa system.

### 7a - HORIZONTAL REGISTRATION TEST

This test helps you fine-tune the drive-belt tension by making any horizontal registration problems easy to see.

To run this test, you need an Apple ///, Apple Writer ///, and familiarity with Apple Writer ///.

- Connect the printer to an Apple ///, using an RS232 cable and a modem eliminator cable.
- 2. Install paper 14 inches wide (or use two sheets of 8 1/2 by 11 inch paper, overlapping them so as to cover the entire platen.)
- 3. Boot Apple Writer /// in the Apple and press <RETURN> twice to obtain a blank screen.
- 4. Type the following embedded commands, starting each at the very beginning of a line:

(NOTE: Each line below starts with two letters. The characters that follow the letters are numbers (except for ".PRINTER"). Make sure you type the numerals 1 and 0, not lower-case L and capital O.)

- .LMO <RETURN>
- .PMO <RETURN>
- .RM133 <RETURN>
- .LIO <RETURN>
- .PD.PRINTER <RETURN>
- .CR1 <RETURN>

- 5. Type the vertical line character | at columns 1, 64, 68, and 132; type <RETURN>.
- 6. Reproduce that "paragraph" at least 15 times in succession. (You are creating a file that will print straight vertical lines at columns 1, 64, 68, and 132. The more times you reproduce the "paragraph", the longer the lines will be, and the easier to check for registration problems.)
- 7. To print the file, hold down <CONTROL> while typing p.
- 8. A prompt line will appear at the bottom of the screen saying [P]rint/Program:.

Type:

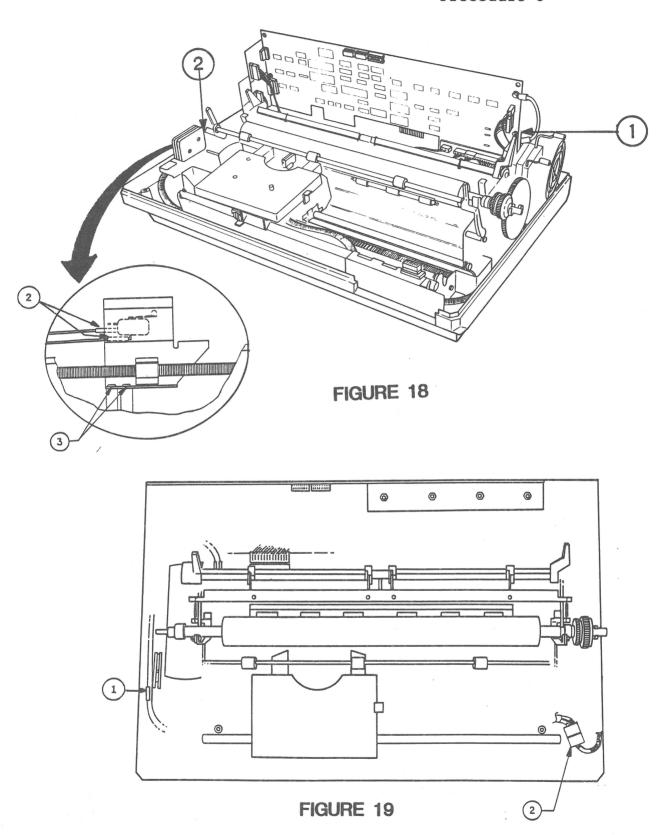
np

# <RETURN>

9. If the lines are straight, the horizontal registration is good; if they are not straight, adjust the drive belt tension and try the test again.

Loose Belt

Well-adjusted Belt



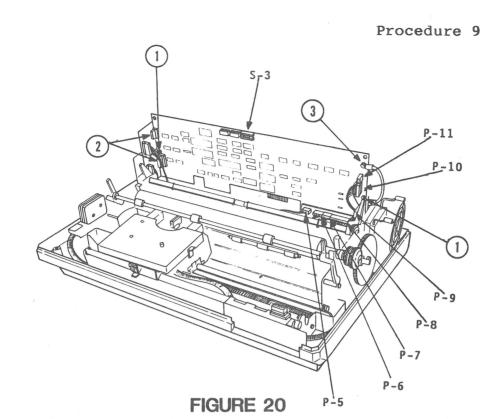
### 8 - REPLACE MECHANICAL ASSEMBLY:

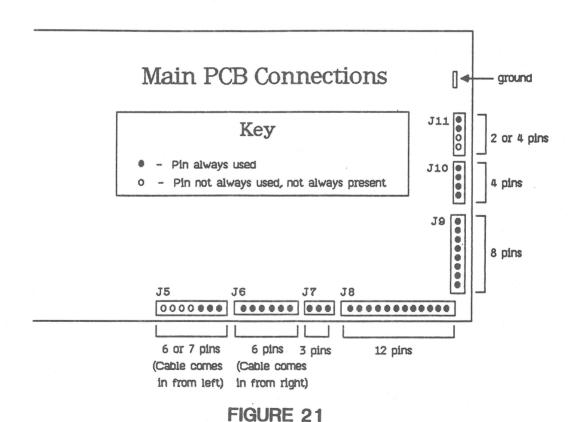
CAUTION: WATCH THE CABLES ON THE RIGHT SIDE OF THE FRAME AS YOU REPLACE THE ASSEMBLY. The drive belt adjustment screw at the right side of the mechanical assembly often catches on these cables and can easily damage them.

- \*1. Several loose cables lie along the right front side of the case. Make sure they are clamped or taped close to the side of the printer, to avoid damage from the drive belt adjustment screw on the mechanical assembly.
- \*2. Slowly lower the mechanical assembly onto the frame. If you removed the cover interlock switch earlier, you can lower the right side of the assembly first: that will help you avoid catching the cables on the drive belt adjustment screw.
- \*3. If you removed the cover interlock switch, reinstall it.
- \*4. Reconnect the two spade connectors to the cover interlock switch (Figure 18 and detail, #2). Remember that the upper pole of the switch is not used; the connectors attach to the lower two poles.
- \*5. Reconnect the right side of the harness cable to its mate. (Make sure the two sides are correctly aligned: there are different versions of the connector, but there is always an obvious key.)
- \*6. Reconnect the left side of the harness cable to the Printwheel Encoder PCB (the lower of the two encoder PCBs).

NOTE: If the Encoder PCB has more pins than the harness cable connector has sockets, examine the connector: there will always be some obvious key to proper installation.

- \*7. Slip the harness cable into its clamp on the left side of the frame (see Figure 19, #1).
- \*8. Reconnect the ground wire to the back of the case, behind the main PCB (see Figure 18, #1).
- \*9. Return and tighten the four long screws on the underside of the printer. (You can line up the screw holes in the mechanical assembly with the holes in the frame by looking down through the mechanical assembly holes.)





### 9 - REPLACE MAIN PCB:

- \*1. Return the main PCB to service position (use midpoint holes for the two fasteners). (See Figure 20, #1.)
- \*2. Reconnect the ground wire. (See Figure 20, #3.)
- \*3. Replace the connectors (see Figures 20 and 21).
- \*4. Plug in the two encoder PCBs. The connectors are keyed so that you cannot put the PCBs on the wrong jacks, but be sure the carriage motor's cable goes to the upper encoder PCB and the (printwheel motor's) harness cable to the lower encoder PCB.

If you are installing a Carriage Assembly or Carriage Motor, return to that procedure now.

\*5. CAUTION: In the following steps, AVOID STRAIN ON THE CABLES.

Release the PCB from the work position and ease it down into its ready position. If any cable seems strained, reroute it.

- \*6. Fit the right, center and left parts of the bottom edge into the slot at the back of the frame, and refasten the white plastic fasteners at the top corners of the PCB.

  IF YOU HAVE TROUBLE POSITIONING THE PCB, make sure the slot is clear of debris and the cables are not obstructed by other components. You will have to push the PCB, but if you have to use too much force, something is probably obstructing the board.
- \*7. Reconnect the ribbon cable to jack S-3 (top center of PCB) (see Figure 20).
- \*8. Replace the ribbon cable from jack S-3 in the cable holders on the back of the PCB.
- \*9. If this is a new PCB, test it with the External Loop Back Test (see Basics).
- \*10. If you are installing a new carriage motor or carriage assembly, return to that procedure.

If the carriage goes crazy when you turn on the printer, you have probably connected the wrong cables to the encoder PCBs.

### 10 - ADJUST RIBBON SHIELD

The metal ribbon shield provides both horizontal and vertical reference marks for text alignment. It also holds the paper against the platen.

# Depth:

- \*1. Remove the ribbon cartridge and printwheel (see User's Manual), and leave the printwheel assembly tilted away from the platen.
- \*2. Push the paper thickness lever (at the left rear of the platen) back all the way.
- \*3. Loosen the two depth control screws on the ribbon shield (see Figure 22, #1).
- \*4. Adjust the shield so that it rests against the platen. Test it by tapping with your finger where it touches the platen (tap both left and right sides). If you can hear the shield clap against the platen, it is too far away: there should be no gap.
- \*5. When the adjustment is correct, tighten the depth control screws.
- \*6. Move the paper release lever forward all the way and test again.

If you are replacing a Carriage Assembly, return to that procedure now.

# Height Adjustment:

- \*1. Insert paper (11 to 14 inches wide) and run the Terminal Self-Test to print out several rows of letters.
- \*2. Remove the ribbon cartridge and check for the following criteria:
  - a) The bottoms of the letters appear on the baseline of the triangular reference holes on either side of the shield.
  - b) The letter that appears in the central cleft of the shield points straight up. (For best results, turn off the printer and move the carriage until the character in the cleft is 1, !, I or |.)
- \*3. If adjustment is necessary, tilt the hammer assembly away from the platen, loosen the up/down mounting screws (see Figure 22, #2) and adjust the shield to the criteria stated in step 2.
- \*4. Tighten the screws and return the ribbon cartridge.

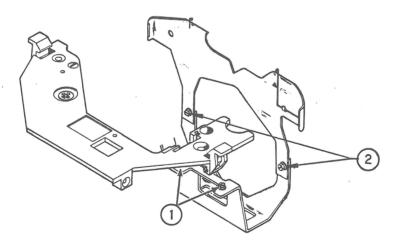


FIGURE 22

### 11 - FINAL CHECK

Whenever you finish any of these procedures, check that the printer is functioning properly before you return it to the customer.

- \*1. Defeat top cover interlock switch.
- \*2. Reconnect AC power cord.
- \*3. Switch on the power to check the Ready lamp.
- \*4. If installing a new main PCB, test the new board's circuitry by running the External Loop Back Test (see Section 1, Basics).
- \*5. Generate a print sample with the Terminal Self-Test.
- \*6. Check the switch settings shown on the printout against the correct settings (shown in **Basics** or on the DWP Reference Card). If the switches are set incorrectly, reset them (see **Basics**).
- \*7. Check the print quality and make any necessary print quality adjustments (see **Troubleshooting** and **Print Quality Adjustments** sections).

# Apple Daisy Wheel Printer Technical Procedures

## Section 4

# Print Quality Adjustments

# Contents:

Paper Feed Idler Gear Adjustment4.3
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Print Hammer Assembly
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Hammer Penetration4.1
Front Stop4.1
Rear Stop4.1
Fine Tuning4.1
Hammer Angle4.1
Ribbon Support Plate
Check Adjustment4.2
Adjust:
Metal Up-Stop (Early Version)4.2
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Platen
When to Check4.2
Height4.2
Depth4.29
Checking the Adjustments4.29
Platen Locator Sleeve4.3

NOTE: The Daisy Wheel Printer should be tested with the Apple II Peripherals Diskette. (See Multi-Product Diagnostics Technical Procedures, Section 1.)

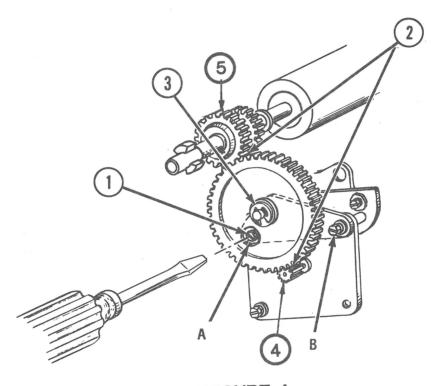


FIGURE 1

#### PAPER FEED IDLER GEAR ADJUSTMENT

WHEN TO CHECK: No line feeding or irregular line feeding (SYMPTOMS)

> First character in each line drops below correct writing line

### Tools and Materials Needed:

Medium flatblade screwdriver Extra screwdriver or other sturdy object to use as a prop for the mechanical assembly

The idler gear (Figure 1, large gear) transmits the rotation of the paper feed motor gear (Figure 1, #4) to the platen drive gear (Figure 1, #5). If the three gears do not mesh properly, line feeding will be irregular and binding or backlash will occur (particularly when paper feeds both forward and reverse, as in plotting graphs).

- 1. Disconnect the AC power cord.
- Remove the access cover and top cover. 2.
- To gain better access to the idler gear screws, loosen or remove the four screws on the bottom of the printer case, lift the front of the mechanical assembly about one inch, and prop it up on the right side with a screwdriver or other object.
- Pull the paper bail forward (away from the platen). (The paper bail is the metal bar with three rubber rollers that holds the paper to the platen. See Basics for names of parts.)
- Turn the platen knob so that screw "A" is visible through the hole in the idler gear (see Figure 1, #1).
- Loosen the idler gear screws ("A" and "B" in Figure 1). 6.
- With screws A and B loose, slowly rotate the platen knob clockwise until the gears mesh easily.

NOTE: Turning the knob clockwise actually causes the gears to mesh correctly. If you don't believe that, try turning the knob counterclockwise.

- While continuing to rotate the knob clockwise, tighten screw B. CAUTION: Do not overtighten!
- Tighten screw A. CAUTION: Do not overtighten!
- Remove the prop and lower the mechanical assembly to 10. normal position. CAUTION: Be careful that the cables at the right front of the printer are not pulled or ripped by the drive-belt-adjustment screw at the right of the mechanical assembly.
- 11. Defeat the top cover interlock.
- 12. Reconnect AC power cord.
- Run the Terminal Self-Test as a check (see Basics). If line feeding is regular, the idler gear is correctly adjusted.
- 14. If a further check is desired, run the Vertical Registration Test (below).
- Retighten the four screws on the bottom of the printer.

Acceptable Adjustment

Poor Adjustment

FIGURE 2

### VERTICAL REGISTRATION TEST (OPTIONAL)

The following test makes any vertical registration problems easy to see. Figure 2 shows print samples generated by this test, using misadjusted and well adjusted idler gears.

To run this test, you need an Apple ///, Apple Writer ///, and familiarity with Apple Writer ///.

- Connect the printer to an Apple ///, using an RS232 cable and a modem eliminator cable.
- Boot Apple Writer /// in the Apple and press <RETURN> twice to obtain a blank screen.
- 3. Type:

<CONTROL>p

(That is, hold down the <CONTROL> key while typing p.)

A prompt line will appear at the bottom of the screen saying [P]rint/Program :.

Type:

### ? <RETURN>

The print/program menu will now appear. Make sure that Print Destination is set to .printer and that Carriage Return is set to 1. If they are set to something else, type:

pd.printer <RETURN>

crl <RETURN>

NOTE: Make sure you type the numeral 1, not lower-case L.

Type <RETURN> to return to the blank screen.

# 7. Type <CONTROL>v

A V should appear on the data bar at the top left of the screen. If not, try again.

8. NOTE: Some of the characters in this step will not appear on the screen. Don't worry about that.

Type the following with no spaces between characters, and DO NOT PRESS <RETURN> until you are told to:

<ESCAPE>

<CONTROL><SHIFT>6

<CONTROL>b

<ESCAPE>

<CONTROL>v

<RETURN>

Type the following line forty eight times to obtain a printout like Figure 2:

<RETURN>

(that is, an underscore followed by a carriage return).

10. Type: <CONTROL>p

np

<RETURN>

This should send the file to the printer for printing.

If the file does not print, or does not look like Figure 2, make sure you have typed it correctly, starting with step 3.

NOTE: Here's what this file does. Steps 3 through 5 ensure that the Apple Writer file will be sent to the printer and that a carriage return will be followed by a linefeed. Steps 7 and 8 are a command sequence that sets the printer's linefeed to 1/48 inch. Step 9 is a print file consisting of 48 underscores, which will be printed one under the other. Step 10 sends the file to the printer. The result should look like Figure 2.

- 12. Compare your printout with Figure 2. If the registration is not acceptable, readjust the idler gear and run the test again.
- When you are done, turn the printer off to restore normal line feeding. (Otherwise, it will continue to use 1/48 inch linefeeds.)

Acceptable Adjustment

Poor Adjustment

FIGURE 2

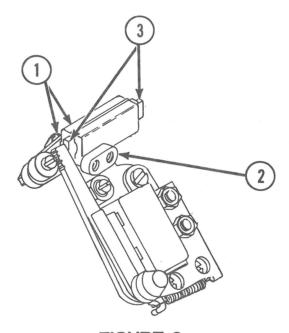


FIGURE 3

# PRINT HAMMER ASSEMBLY REMOVAL/REPLACEMENT

WHEN TO REPLACE: If print quality varies irregularly and printer has been used for at least 2 years and other adjustments fail to correct problem

#### Tools and Materials Needed:

Small or medium flatblade screwdriver 3/16 inch wrench Ruler

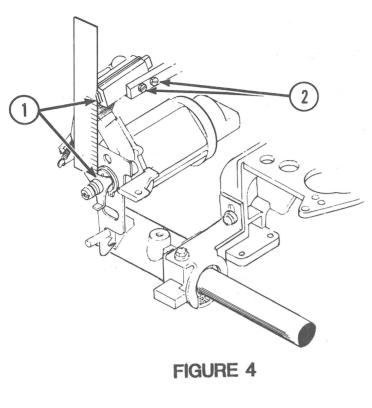
CAUTION: When you remove the hammer assembly (that is, the hammer and its black housing), hold the hammer in place. you let the hammer escape from the assembly, a spring inside the hammer pops out and is easy to lose.

#### To Remove:

- 1. Disconnect the AC power cord.
- Open the access panel.
- Remove the ribbon cartridge and printwheel.
- Holding the ends of the print hammer with your thumb and index finger (see Figure 3, #3), remove the two adjustment screws (Figure 3, #1) with either a flatblade screwdriver or a 3/16 inch box wrench.
- Retrieve the nut plate (Figure 3, #2), which came loose as the screws were removed.
- 6. Remove the hammer assembly.

### To Replace:

- Grasping the print hammer between your thumb and index finger, hold the assembly in place and insert the two adjustment screws.
- Release the print hammer and put the nut plate in position (flat side of plate toward hammer assembly).
- Tighten the screws part way.



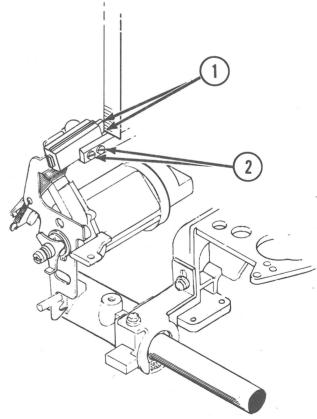


FIGURE 5

- Measure the distance between the printwheel inner hub and the bottom of the print hammer (see Figure 4, #1: the figure shows the view from the platen side).
- If this distance is not 1 3/4 inches, adjust it by 5. loosening the two adjustment screws (see Figure 4, #2), moving the hammer, and retightening the screws.

NOTE: Don't labor over exact measurement at this point. These adjustments are only rough and will be refined later.

- Next, rest the ruler on top of the casting above the adjustment screws (on the side where you inserted the screws) and measure the distance to the top of the print hammer (see Figure 5, #1).
- If the distance is not 1/8 inch, adjust it by loosening the two print hammer adjusting screws (see Figure 5, #2), moving the hammer, and retightening the screws.
- If you have not already done so, retighten the 8. adjustment screws. DO NOT OVERTIGHTEN!
- Complete the hammer penetration and front and rear stop adjustments (procedures on following pages); then perform the Print Hammer Angle Adjustment.

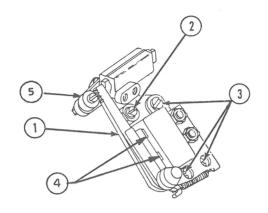
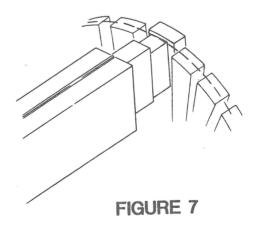


FIGURE 6



#### PRINT HAMMER PENETRATION AND FRONT AND REAR STOP ADJUSTMENTS

WHEN TO CHECK: Characters missing or light or too heavily inked After installing new hammer

#### Tools and Materials Needed:

Apple Combination Gauge Small flatblade screwdriver 3/16 inch wrench

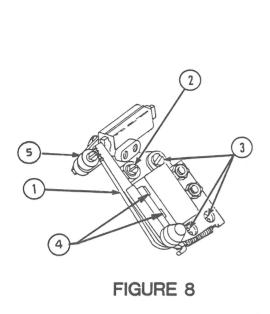
The penetration adjustment is critical to print quality. If the penetration is too shallow, the print will be light; if it is too deep, it may puncture the paper and will cause excessive wear and breakage of printwheels, as well as messy printing. To adjust the penetration, you must move the front and rear stops (Figure 6, #2 and #5) out of the way. And of course, that means that you will have to adjust them as your next step.

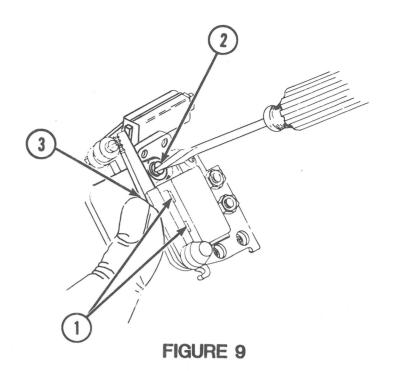
The hammer armature front stop (Figure 6, #2) limits wear between the armature (Figure 6, #1) and the coil pole pieces (Figure 6, #4). The adjustment is more to reduce wear than to improve print quality.

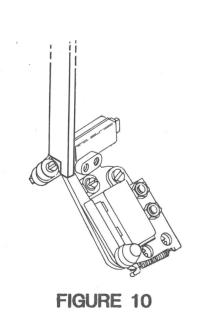
The rear stop establishes the rest position of the hammer, and it, too, affects print quality. If the hammer rests too far forward, it won't gain enough speed before it hits the printwheel, and the print will be light. If it rests too far back, it may hit the printwheel too hard and cause messy, overinked printing.

#### To Inspect:

- Remove the printwheel and lay it on a flat surface.
- Inspect the printwheel to see that all spokes are in the same plane and that none are bent or warped. If damaged, replace with a new printwheel.
- Return the printwheel to the printer and tilt the printwheel assembly toward the platen until it is locked in the print-ready position.
- Move the armature (Figure 6, #1) against the coil pole pieces (Figure 6, #4), and check that the hammer is deflecting a printwheel spoke about half the thickness of a spoke, as shown in Figure 7. Check this measurement at several locations around the printwheel (simply spin the printwheel with your finger). If adjustment is needed, follow the procedure below.







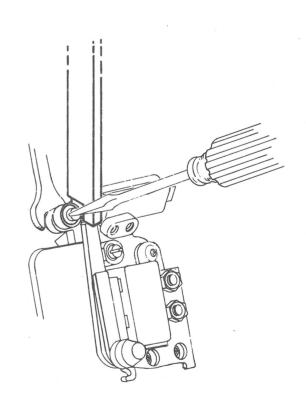


FIGURE 11

# To Adjust Penetration:

- The front stop (Figure 8, #2) is an eccentric screw held in place by a locking nut. With a 3/16 inch wrench on the nut and a flatblade screwdriver in the eccentric, loosen the eccentric.
- Move the front stop all the way forward, to allow movement of the armature assembly.
- With a 3/16 inch wrench and a screwdriver, loosen the lock nut on the rear stop (Figure 8, #5; see Figure 11).
- Rotate the eccentric to move the rear stop all the way back, to allow movement of the armature assembly.
- 5. With a flatblade screwdriver, loosen the three armature penetration screws (see Figure 8, #3). NOTE: To reach the top screw, hold the print hammer's release lever out of the way.
- Move the armature assembly forward or backward to achieve the desired penetration of half the thickness of a spoke. Tighten screws and recheck the adjustment.
- When the adjustment appears satisfactory, adjust the front and rear stops (see next section).

# To Adjust Front Stop:

- Loosen the front stop (Figure 9, #2) with a 3/16 inch wrench on the nut and a flatblade screwdriver in the eccentric screw.
- Push the hammer armature (Figure 9, #3) against the coil pole pieces (Figure 9, #1).
- Using the screwdriver, rotate the front stop so that the hammer armature just touches the coil pole pieces and the front stop. Then carefully tighten the nut on the front stop. DO NOT OVERTIGHTEN!

## To Adjust Rear Stop:

- Push the hammer armature against the coil pole pieces and hold it there.
- Try to insert the slot at the #3 end of the combination gauge between the rear stop and the armature (see Figure 10). If it fits loosely or not at all, go on to the next step.

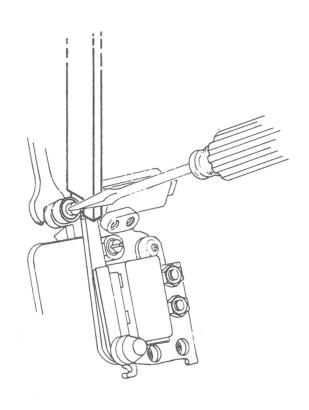


FIGURE 11

- To adjust the rear stop, use a 3/16 inch wrench and a screwdriver to loosen the rear stop lock nut (see Figure 11).
- Rotate the rear stop so that the gauge fits.
- Carefully tighten the rear stop lock nut (DO NOT OVERTIGHTEN) and remove the combination gauge.
- 6. Perform fine tuning (below).

# Hammer Adjustment Fine Tuning

- Generate a print sample by running the Terminal Self-Test. If all characters appear too light or dark, refine the penetration adjustment. If the tops or bottoms of characters are light, perform the Print Hammer Angle Adjustment (see next page).
- Rerun Terminal Self-Test and refine all adjustments until ink density is equal on top, bottom, and both sides of each character.

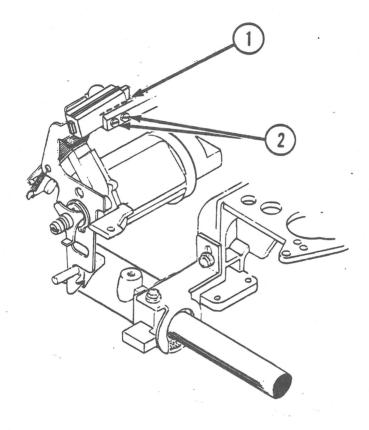


FIGURE 12

#### PRINT HAMMER ANGLE ADJUSTMENT

Tops of letters missing (raise rear of WHEN TO ADJUST: hammer)

> Bottoms of letters missing (lower rear of hammer)

#### Tools and Materials Needed:

Small flatblade screwdriver 3/16 inch wrench Pencil

NOTE: For best results, use a Proportional Space printwheel for testing this adjustment: the greater size of the characters creates a "worst case" condition which makes any misadjustment easy to see.

- Generate a print sample by running a Terminal Self-Test (see Basics). If the tops or bottoms of letters are missing or light, continue this procedure.
- Draw a reference line on the hammer housing so that you can see your adjustments (see Figure 12, #1).
- Remove the ribbon cartridge. 3.
- 4. Loosen the adjustment screws (Figure 12, #2).
- If the tops of letters are missing, raise the rear of the print hammer; if the bottoms of letters are missing, lower the rear.
- Tighten the adjustment screws.
- Replace the ribbon cartridge and run another Terminal 7. Self-Test to check adjustment.
- Repeat steps 3-7 until print quality is optimum. 8.

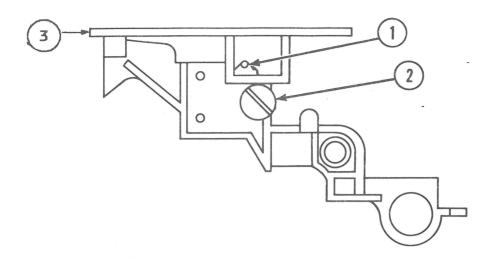
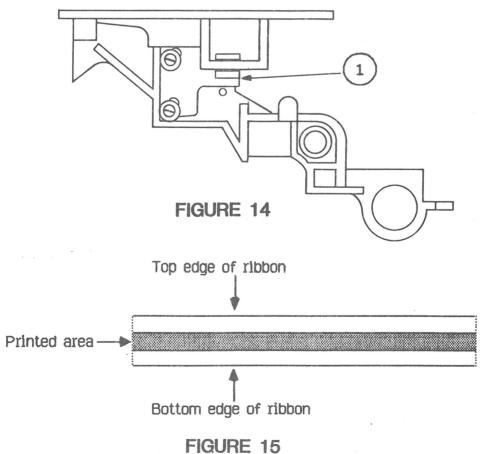


FIGURE 13

RIGHT SIDE VIEW OF CARRIAGE ASSEMBLY



#### RIBBON SUPPORT PLATE ADJUSTMENT

WHEN TO ADJUST: Tops or bottoms of characters not printing and type too high or low on ribbon (see (SYMPTOMS) explanation below)

#### Tools and Materials Needed:

1/4 inch wrench Medium flatblade screwdriver

If some letters are getting insufficient inking at top or bottom, check the ribbon first. The printwheel may be hitting too high or too low on the ribbon, and you can tell that by simple inspection: the printwheel should be hitting the middle of the ribbon (see Figure 15). If the printwheel is hitting too close to the top or bottom edge of the ribbon, the tops or bottoms of characters will be lost.

To correct this, you can adjust the ribbon position -- by adjusting the ribbon support plate (Figure 13, #3), which the ribbon rests on. This is the only situation in which you would adjust the ribbon support plate.

There are two arrangements of the ribbon support plate. Older models have a metal eccentric (Figure 13, #2) and upstop (Figure 13, #1), which adjust and stabilize the height of the plate. Newer models use a plastic bracket (Apple P/N 970-0626; Figure 14, #1), which should be retrofitted onto older models if the metal up-stop breaks. Adjustment procedures for the up-stop and eccentric are given first; those for the plastic bracket, second.

# TO CHECK ADJUSTMENT

NOTE: For best results, use a Proportional Space printwheel for testing this adjustment: the greater size of the characters creates a "worst case" condition which makes any misadjustment easy to see.

- Obtain a print sample by performing a Terminal Self-Test, printing at least one full line of the complete character set.
- Remove the ribbon cartridge and look at the used section of ribbon. The printwheel should be hitting exactly in the middle of the ribbon (see Figure 15). If the printwheel is hitting higher or lower than that, adjust the ribbon support plate.

#### CONTINUED ON NEXT PAGE

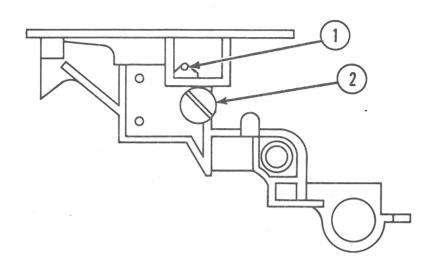
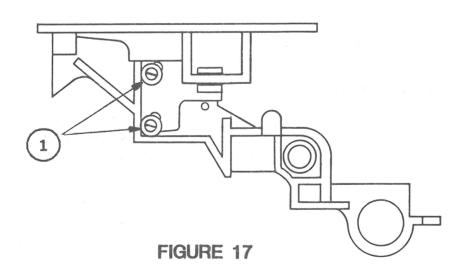


FIGURE 16



#### TO ADJUST

# For Models with Metal Up-Stop

CAUTION: The up-stop breaks off easily if its nut is overtightened.

- Disconnect the AC power cord.
- 2. Remove the ribbon cartridge.
- Loosen the nut on the back of the up-stop with a 1/4 inch wrench. Rotate the up-stop to its highest position. (See Figure 16, #1.)
- Use a flatblade screwdriver in the eccentric (Figure 16, #2) to raise or lower the support plate. If the print is too high on the ribbon, the ribbon is too low, so raise the support plate.
  - If print is too low on ribbon, ribbon is too high, so lower the support plate.
- When the support plate is properly adjusted, lower the up-stop so that it touches the support plate, and carefully tighten the nut. (DO NOT OVERTIGHTEN.)
- Check the adjustment (see "TO CHECK ADJUSTMENT," above); readjust the support plate as necessary.

# For Models with Plastic Bracket

- 1. Disconnect the AC power cord.
- Remove the ribbon cartridge.
- Loosen but do not remove the two bracket adjustment 3. screws (Figure 17, #1).
- 4. If the print is too high on the ribbon, raise the support plate by pulling the plate upwards and then tightening the bracket screws.
  - If print is too low on ribbon, lower the support plate by pushing down on it and then tightening the bracket screws.
- Check the adjustment (see "TO CHECK ADJUSTMENT," above); readjust the support plate as necessary.

#### PLATEN HEIGHT AND DEPTH ADJUSTMENT

WHEN TO CHECK: (SYMPTOMS)

Tops or bottoms of characters not printing; ribbon support plate and hammer adjustments do not solve problem

Print quality lighter at one side of page

#### Tools and Materials Needed:

Torx screwdriver (see Tools section of Basics) Apple Combination Gauge 5/8 inch open-end wrench or duckbill pliers or needlenose pliers Medium flatblade screwdriver

You will almost never need to adjust the platen. It is fitted with tamper-proof Torx screws to discourage users from changing the adjustments, and in normal use the adjustments are not likely to shift.

However, if the tops or bottoms of letters are not printing, and the print hammer or ribbon support plate adjustments do not remedy the problem, check the platen height. If the platen is too high, the bottoms of letters will not print; if it is too low, the tops will be missing. (See Table 1 for print samples.)

If the print quality varies from the left side to the right side of the printed line, uneven platen depth almost certainly is the cause.

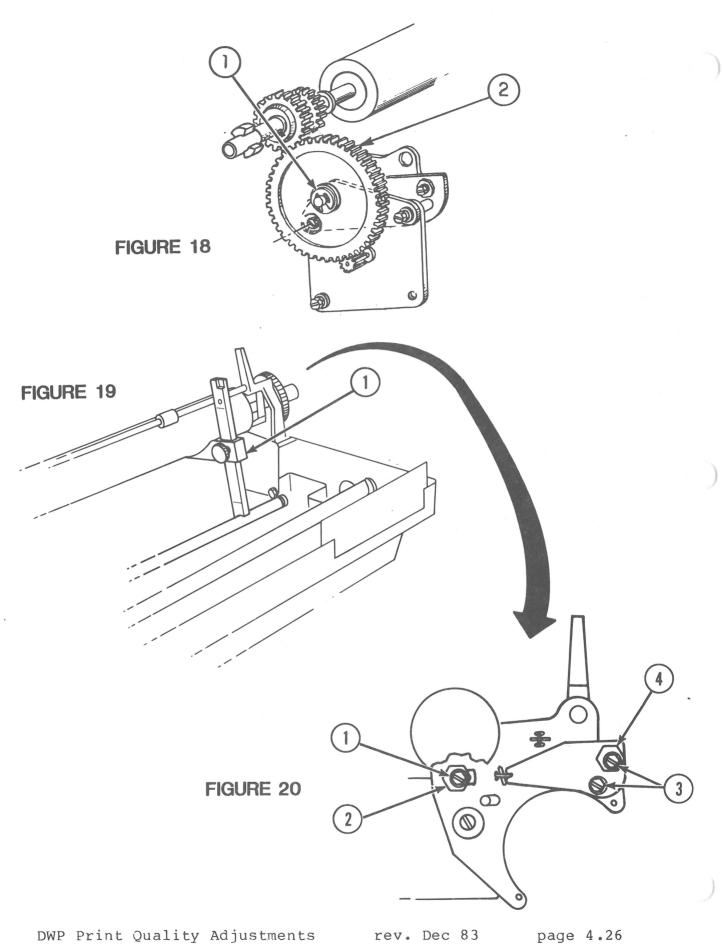
If you do not have the special Torx screwdriver that fits the platen adjustment screws, you will have to loosen and tighten the screws with pliers.

NOTE: Do not adjust the platen unless you are sure that it is necessary: once you change the platen adjustment, you increase the chances that it will need to be adjusted in the future.

#### A. HEIGHT

- 1. Disconnect the AC power cord.
- 2. Remove the top cover.

#### CONTINUED ON NEXT PAGE



- Remove the idler gear (Figure 18, #2) by removing the Eclip (Figure 18, #1) and pulling the gear off.
- Move the paper thickness lever (left side, behind 4. platen) to full forward position.
- Move the carriage assembly to the center of the printer.
- Set the combination gauge slide to the #2 position and 6. place it between the rear guide shaft and the platen, near the right side of the platen. (See Figure 19, #1.)
- If there is a space between the gauge slide and the platen, or if the gauge slide does not fit under the platen, the platen is misadjusted and you should continue with step 8. Otherwise, skip to step 10.
- Loosen the lock screw (Figure 20, #1) just enough to allow rotation of the 5/8 inch eccentric nut (Figure 20, #2). (Rotating the eccentric changes the height of the platen.)
- Now rotate the eccentric (with 5/8 inch wrench or pliers) until the surface of the platen just touches the combination gauge slide. Then tighten the lock screw.
- Repeat steps 6-9 for the left side of the platen. (See Figure 21, #1.)
- Check the adjustments (see below, Section C): Adjusting 11. the platen height may cause changes in the platen depth adjustment. Be sure to check that too. (See next page.)

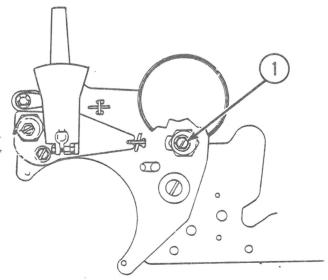
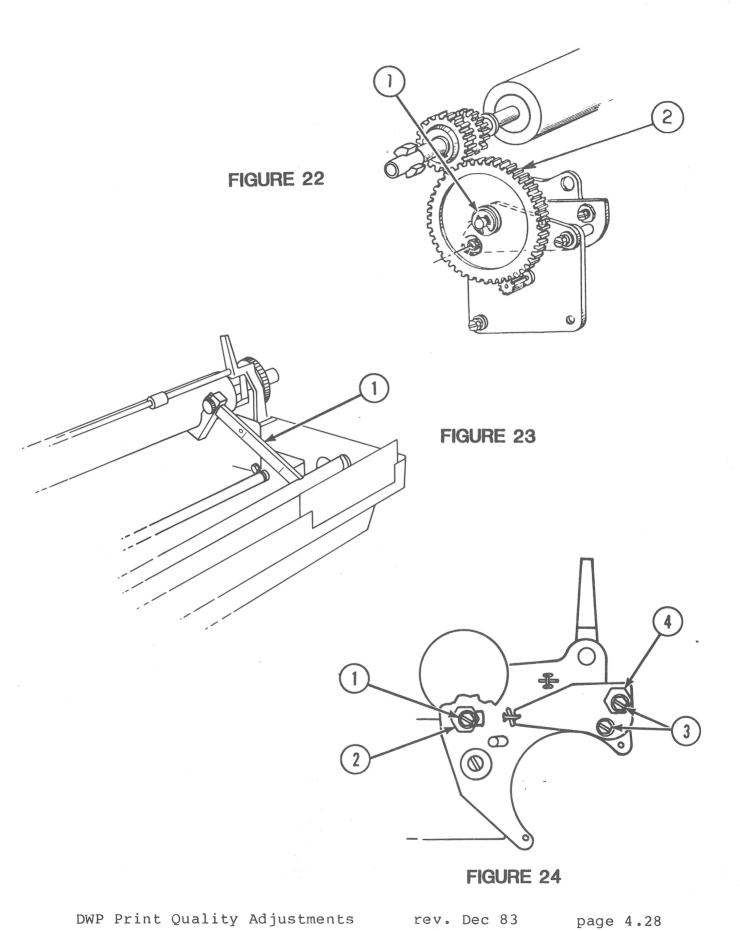


FIGURE 21



#### DEPTH B.

- 1. Disconnect the AC power cord.
- 2. Remove the top cover.
- Remove the idler gear (Figure 22, #2) by removing the Eclip (Figure 22, #1) and pulling the gear off.
- Move the paper thickness lever (left side, behind 4. platen) to full forward position.
- 5. Move the carriage assembly to the center of the printer.
- Set the combination gauge to the #3 position and insert it on the right side of the printer between the front shaft and the platen. (See Figure 23.)
- If the gauge fits too loosely or not at all, loosen the two lock screws (Figure 24, #3) just enough to allow rotation of the rear 5/8 inch eccentric nut (Figure 24, IMPORTANT: YOU MUST LOOSEN BOTH SCREWS. OTHERWISE YOU MAY SHEAR OFF THE BOTTOM SCREW WHEN YOU TRY TO ADJUST THE ECCENTRIC.
- Rotate the eccentric (with 5/8 inch wrench or duck-bill pliers) until the platen's front surface just touches the combination gauge slide. Then tighten both lock screws.
- Remove the combination gauge and replace it on the left
- 10. Repeat steps 6 - 8 for the left side of the printer.
- 11. Check the adjustments (see below): Adjusting the platen depth may cause changes in the platen height adjustment.

#### C. CHECKING THE ADJUSTMENTS

NOTE: For best results, use a Proportional Space printwheel for testing these adjustments: the greater size of the characters creates a "worst case" condition which makes any platen height misadjustment easy to see.

Recheck the platen height and depth adjustments with the combination gauge. Make additional adjustments as necessary.

#### CONTINUED ON NEXT PAGE

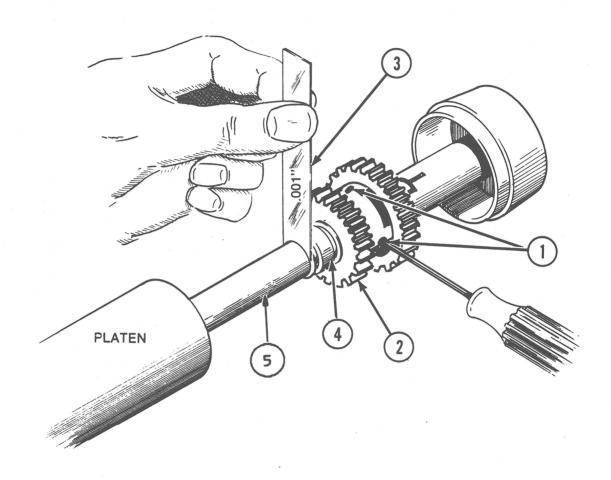


FIGURE 25

6. At the loose point of the two sleeves, try to insert a .004 inch feeler gauge. If you can insert it, the sleeves are too loose and should be adjusted. If you cannot insert the .004 inch gauge, try to insert a .001 inch gauge. If you can insert it, the sleeves are well adjusted. If you cannot insert it, the sleeves are too tight and should be adjusted.

## To Adjust:

- 1. Hold the platen upright so that the tractor gear (Figure 25, #2) is at the top.
- 2. Find the point at which the two sleeves are loosest. If you can, insert a .001 or .0015 inch feeler gauge between the sleeves (see Figure 25). (If you can't, go on to step 3).
- Loosen the two collar set screws (Figure 25, #1) with the .072 inch six-flute spline wrench. (Insert the .001 or .0015 inch feeler gauge between the sleeves at the loosest point between them, if you have not already done so.)
- Let gravity push the tractor gear against the feeler gauge; then tighten the set screws.
- Remove the feeler gauge and try to twirl the bearing sleeve (Figure 25, #5). A small amount of binding is acceptable, but you should be able to overcome it with a little pressure from your fingers. If the sleeve binds strongly, loosen the collar set screws and repeat the adjustment using a .002 inch feeler gauge.
- When the .001 or .0015 feeler gauge fits and the bearing sleeve does not bind badly when twirled, test the gap with a .004 inch gauge. If the larger gauge fits, the gap is too large. If you cannot readjust the sleeves to within tolerance (.001 to .003 inch gap), replace the platen or the bearing sleeve.
- 7. Return the platen and platen knob.
- Defeat the top cover interlock switch.
- Load paper and run the Terminal Self-Test as a check. Make sure the spacing between lines is even: if not, loosen the sleeve. Also run the Horizontal Registration Test (see Take-Apart Section).

# Apple Daisy Wheel Printer Technical Procedures

# Section 5

# Preventive Maintenance

# Contents:

Introduction5.3
Cleaning5.5
Lubrication - One Year Cycle
Lubrication - Two Year Cycle
Special Maintenance for Harsh Environments5.11

#### B. CLEANING

#### Printwheel:

- 1. Remove printwheel.
- Soak printwheel in low residue cleaner such as alcohol.
- 3. Use medium stiff brush to clean (gently).
- 4. Thoroughly rinse in clean water and dry.
- 5. Reinstall when dry.

NOTE: DWP's that use a fabric-based ribbon may require more frequent printwheel cleaning.

# Platen, Feed Rollers, Paper Bail Rollers (Rubber Parts):

- 1. Remove top cover, ribbon cartridge and printwheel.
- 2. Remove platen.
- 3. Lift platen cradle out of the way (see Figure 2).
- 4. Moisten a soft cloth with Fedron platen cleaner and clean platen (Figure 1, #1), paper bail rollers (Figure 1, #2), and feed rollers (Figure 2, #1).

CAUTION: FEDRON SHOULD BE USED ONLY IN A WELL VENTILATED AREA. DO NOT USE FEDRON ON PLASTIC PARTS.

NOTE: It is important to use an approved platen cleaner, such as Fedron brand. The platen must offer a specific resiliency to the print hammer. Platen cleaner restores resiliency; other solvents will harden the platen and cause impaired printer performance.

### Ribbon Shield and Metal Parts:

- Remove top cover, ribbon cartridge, printwheel and platen.
- Clean the ribbon shield and other metal parts with a soft rag and a safe degreasing agent (such as isopropyl alcohol or Freon).

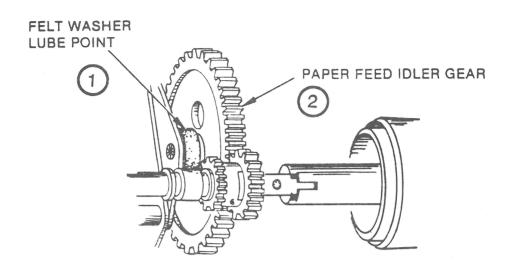


FIGURE 3

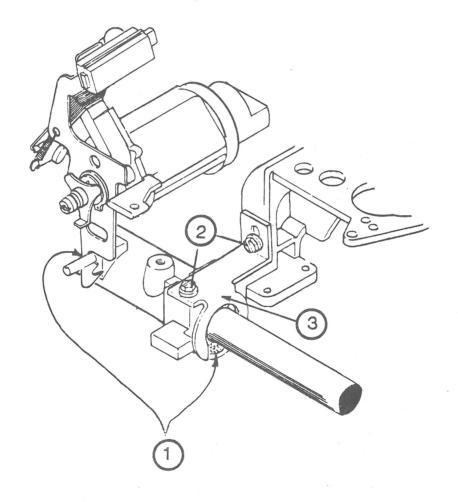


FIGURE 4

#### C. LUBRICATION - ONE YEAR CYCLE

Once every year or every 2000 hours, perform the following lubrications:

# 1. Paper Feed Idler Gear Stud:

Once a year, or every 2000 operating hours, lubricate the felt washer behind the paper feed idler gear (see Figure 3, #1) with ten drops of Tellus #46 oil. Wipe off any excess oil. Do not lubricate the idler gear itself (Figure 3, #2).

# 2. Carriage Drive Shaft and Felt Wipers:

There are two felt wipers on the rear carriage guide shaft (see Figure 4, #1). Once a year, or every 2000 hours:

- a) Wipe the carriage drive shaft clean with a soft cloth moistened with isopropyl alcohol or freon.
- b) Use a 3/16 inch wrench and/or a small screwdriver to remove the two screws (Figure 4, #2) on the retaining clamp (Figure 4, #3) on each side of the carriage assembly (Figure 4 shows only one side). Inspect the felt wiper. If very worn or dirty, remove and replace it. Otherwise, go on to step c.
- c) Lubricate both left and right wipers with Tellus #46 oil. If wipers are new, use 10 drops on each; if not new, use 5 drops each.
- d) Slide the carriage assembly back and forth to lubricate the shaft.
- e) Wipe off excess oil with a clean dry cloth and repeat step d.

# 3. Clean and lubricate the front carriage guide shaft:

Once a year, or every 2000 operating hours:

- a) Clean the front guide guide shaft with a soft cloth moistened with isopropyl alcohol or freon.
- b) Apply 3 drops of Tellus #46 oil with a cotton swab.
- c) Slide the carriage back and forth to lubricate the shaft.
- d) Wipe off excess oil with a clean dry cloth and repeat step c.

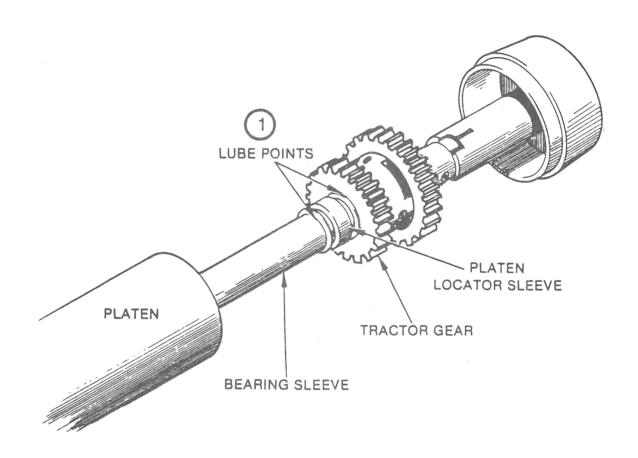


FIGURE 5

#### LUBRICATION - TWO YEAR CYCLE D.

Once every two years, perform the following lubrication:

# Platen Sleeve Bearings:

- 1. Remove top cover and platen.
- Place two drops of Tellus #46 oil at one end of the 2. platen sleeve (see Figure 5, #1), and hold the platen vertical so that the oil flows down the shaft.
- Twirl the sleeve to distribute the oil evenly; then wipe off excess oil. Avoid getting oil on the platen surface.
- 4. Repeat steps 2 and 3 for the other end of the platen.
- 5. Replace platen and top cover.

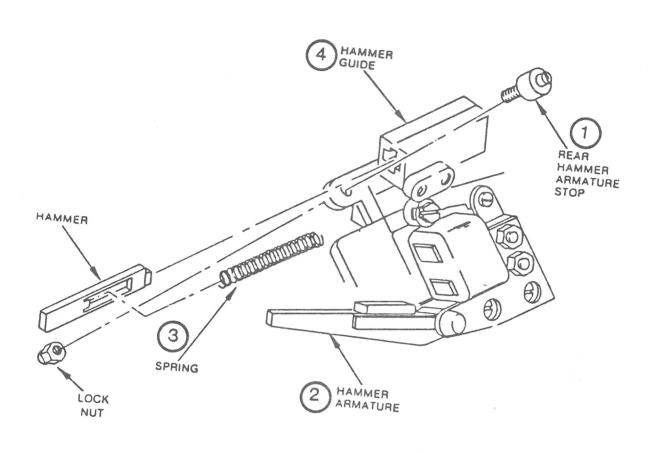


FIGURE 6

#### E. SPECIAL MAINTENANCE FOR HARSH ENVIRONMENTS

Where printers are subjected to airborne dirt and corrosive substances, the print hammer may need occasional cleaning and lubrication. This is not necessary under normal operating conditions.

- Disconnect AC power cord. Remove the access cover and ribbon cartridge. Unplug the connector on the hammer coil.
- Remove the rear hammer armature stop (Figure 6, #1) and allow the armature to pivot toward the front of the printer (toward the operator) (see Figure 6, #2).
- Being careful to hold on to the hammer spring (Figure 6, #3) so it will not be lost, remove the print hammer from the hammer guide (Figure 6, #4) by sliding it out toward the front of the printer. Remove and retain the spring.
- Clean both the hammer and the inside of the hammer quide with isopropyl alcohol or Freon solvent. Use a cotton swab moistened with solvent to clean inside the hammer guide. DO NOT USE SPRAY SOLVENTS.
- Carefully replace the spring inside the hammer and install the hammer in the hammer guide. (Note that the face of the hammer is wedge-shaped. Install the hammer with the wide end of the wedge up.)
- Pivot the hammer armature against the print hammer coil and reinstall the rear stop and locknut. Reconnect the hammer coil connector.
- Adjust the print hammer rear stop (hammer armature rear stop) (see Print Quality Adjustments).
- 8. Replace the ribbon cartridge and the access cover.
- Perform terminal self-test to check print quality and make any necessary hammer adjustments.

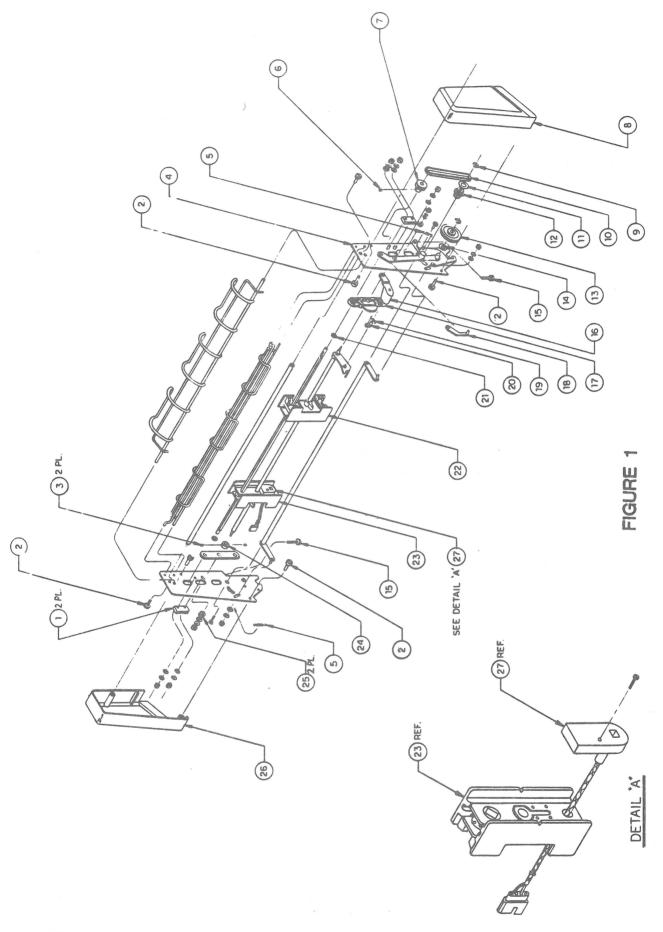
# Apple Daisy Wheel Printer Technical Procedures

# Section 6

# Forms Tractor

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DWP Forms Tractor

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#### INTRODUCTION

The exploded drawing on the left shows the DWP Forms Tractor (DWP-FT). All parts available to Level 1 Service Centers are listed below, and are pointed out on the drawing. Replacement of these parts is optional at Level 1: there is no spares kit, and any failed DWP-FT may be shipped to the Level 2 Service Center for repair, using Apple P/N 668-94510 (defective unit) and standard RMA procedure for "out-of-box failures". If you choose to do repairs, contact your Level 2 Service Center for prices of piece parts.

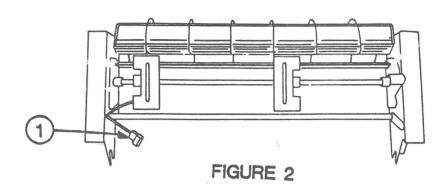
The table below lists the parts on the diagram, ordered by their number on Figure 1. Special tools you will need for piece repairs are listed below the table.

Table 1

Number	Description	Apple Part No.
1	Rack, Adjust	970-0500
2	Screw, #8-32 x 1/2 SEMS	970-0562
3	Scr, $\#6-32 \times 1/8$ Splined	970-0525
4	Side Plate Assy, R.H.	699-0122
5	Spring, Extension	970-0517
6	Scr, #8-32 x 1/8 Splined	970-0526
7	Pulley, 30 Groove	970-0516
8	Cover, R.H.	970-0548
9	E-Ring, 5133-37	970-0524
10	Timing Belt	970-0537
11	Shoulder, Pulley	970-0511
12	Gear, Pulley	970-0515
13	Gear, Idler	970-0514
14	Washer, Thrust	970-0538
15	Stud, Adjust	970-0503
16	Lever, Adjust	970-0513
17	Plate, Ratchet	970-0512
18	Arm, Tension	970-0510
19	Spring, Extension	970-0519
20	Pawl, Ratchet	970-0509
21	Washer, Thrust	970-0534
22	Tractor Assembly, R.H.	699-0123
23	Tractor Assembly, L.H.	699-0124
24	Collar	970-0501
25	Pinion, Adjust	970-0502
26	Cover, L.H.	970-0551
27	Switch/Brkt Assy	699-0125

#### RECOMMENDED SPECIAL TOOLS

.072" spline wrench (size DS), six-flute .096" spline wrench (size DS), six-flute



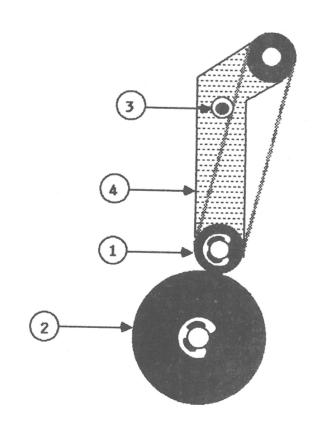


FIGURE 3

#### NOTES ON SPECIFIC PROCEDURES

# A. Timing Belt Replacement/Adjustment

Tools: Medium flatblade screwdriver, 1/4 inch wrench, DWP spring gauge, ruler.

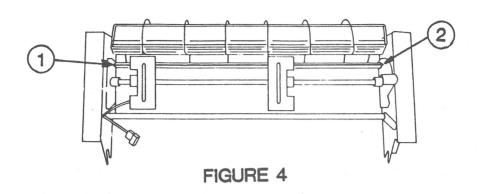
- Carefully unplug the connector at the left of the Forms Tractor (Figure 2, #1) from the printer, and then lift the Forms Tractor from the DWP.
- 2. Move the right-hand tractor assembly next to the left hand assembly, so that it is out of the way for the next step. (There is a position-lock lever in the middle of each tractor assembly. To move the assembly, release the lever.)
- 3. Remove the two screws that hold the right-hand side cover and remove the cover.
- 4. Remove the E-ring and the black plastic washer from the lower drive-belt gear (Figure 3, #1)
- 5. Slip the timing belt off its gears.
- 6. Slip the new belt over the upper gear, then the lower.
- 7. Reinstall the black plastic washer and the E-ring on the lower gear.

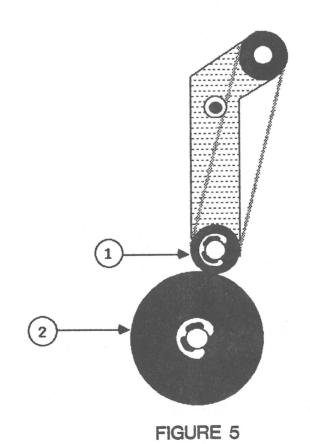
# Adjusting the Timing Belt:

A new timing belt should be adjusted so that there is neither binding nor backlash: that is, the gears that drive the belt (Figure 3, #1 and 2) should turn easily but without any appreciable free play between their teeth. This adjustment should also be performed if any Forms Tractor shows symptoms of binding or backlash such as uneven line feeding (poor vertical registration) or failure to advance paper.

- 1. Remove the right-hand cover, as in the procedure above.
- 2. Using a 1/4-inch wrench, loosen the nut on the sliding arm under the timing belt (Figure 3, #3).
- 3. Grasping the lower pulley, move the sliding arm (Figure 3, #4) until the belt feels taut. Tighten the nut. Then test the tension by lining up a ruler with one side of the belt and pushing on the belt with a spring gauge until the gauge registers 1/2 lb. The belt should be deflected 1/4", + or 1/8". Readjust if necessary.

Then try out the tractor on the DWP to check for binding or backlash. If all is well, put the side cover back on.





# B. Tractor Assembly Replacement

Apple recommends that you let Level 2 centers perform this replacement. To remove the tractors, you must first remove the pinion at the end of the round central shaft. The pinion is press-fitted on to the tapered end of the shaft; it requires a wheel puller for removal.

# C. Paper-out Sensor Replacement/Adjustment

Apple recommends that you let Level 2 centers replace the paper-out sensor. If the sensor should come loose, you can re-glue it to the Forms Tractor with Loctite #6 or equivalent fast-drying bonding agent. To position the sensor correctly for regluing, follow these steps.

- With the DWP power on and the Forms Tractor installed, load 16-lb. paper into the Forms Tractor. If the sensor is too loose, the paper will not trip the sensor switch. As a result, the Attend Light on the front panel of the DWP will go on and the printer will stop printing.
- 2. Move the sensor against the paper until the Attend Light on the DWP goes off. (This indicates that the sensor switch "senses" the paper.) Mark this position on the left hand tractor assembly. Then apply glue and position the sensor.

#### CLEANING AND LUBRICATION

If the plastic surfaces of the DWP-FT become soiled, use Formula 409 or any mild soap solution to clean them. Lubricate the Forms Tractor with Tellus oil (Apple P/N 970-0006). Every 18 months, put one drop of oil on each location pointed out in Figures 4 and 5 (see instructions below). In harsh environments and heavy usage applications, more frequent lubrication may be necessary.

- 1. Remove the forms tractor from the printer.
- 2. Put one drop of Tellus oil at each end of the square drive shaft (see Figure 4, #1 and #2).
- 3. Remove the right side cover of the forms tractor.
- 4. Remove the E-ring from the lower timing belt gear (Figure 5, #1). Remove the gear and put one drop of Tellus oil on the metal shaft.
- Remove the E-ring from the idler gear (Figure 5, #2).
   Remove the gear and put one drop of oil on the shaft.
- 6. Replace both gears and E-rings.

# Apple Daisy Wheel Printer Technical Procedures

# Section 7

# Mechanical Cut Sheet Feeder

# Contents:

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Adjusting the Out-of-Paper Switch
Replacing the DWP Platen Cradle and Feed Rollers7.11
Cleaning and Lubrication7.12

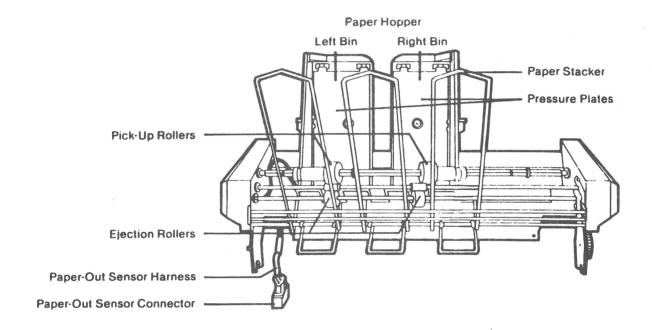


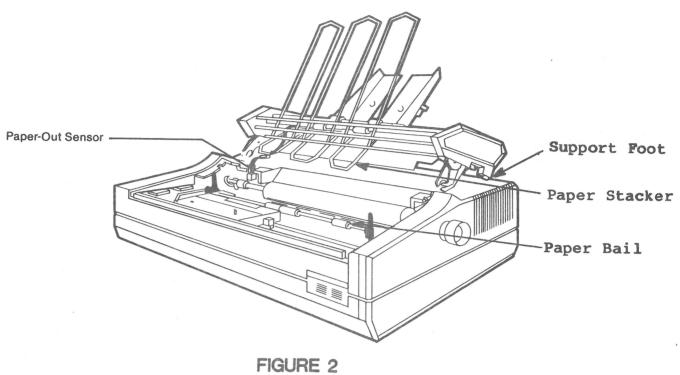
FIGURE 1

#### INTRODUCTION

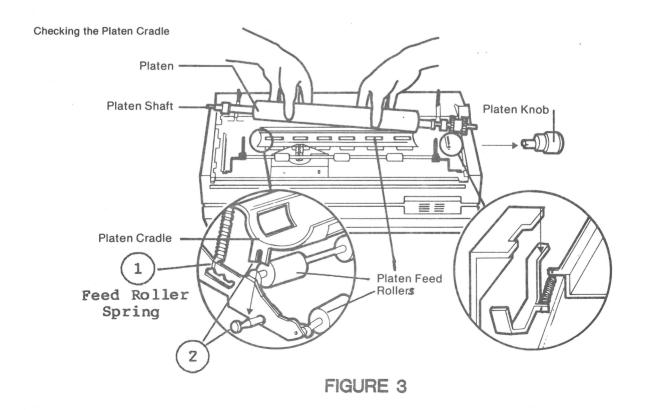
For installation and removal procedures, see the Apple Mechanical Cut Sheet Feeder User's Manual.

Early model DWPs may have the following problems using a Sheet Feeder:

- 1. ROM version 1.6 or earlier may cause Sheet Feeder malfunctions. (To determine what version is installed, run the DWP Terminal Self-Test.) Main PCB ROMs should be upgraded to Software Version 1.7 in order to use the Sheet Feeder; the ROMs are packaged with the Sheet Feeder.
- On some early machines, the feed rollers and the platen cradle may be incompatible with Sheet Feeder operation and will cause folding and/or tearing of the top edge of the paper. In such a case, if adjustment of the Sheet Feeder's support feet does not remedy the situation, the cradle and feed rollers must be replaced; the procedure is on p. 7.11. The Troubleshooting section (p. 7.5) tells how to deal with these situations.
- 3. Very early DWPs may need to have Paper-Out Sensor Retrofit Kits (P/N 672-8011) installed, if they lack the connector for the Out-of-Paper switch cable. Instructions are packed with the Kit.







#### TROUBLESHOOTING

- A. Top edge of paper folds, tears.
  - 1. Adjust the Sheet Feeder's support feet to change the angle of feed. CAUTION: Make sure that the paper stacker does not interfere with the movement of the paper bail (see Figure 2).
  - 2. Remove the DWP access cover, Sheet Feeder, DWP top cover and platen. Check the platen cradle and feed rollers (see Figure 3):
    - cradle seated correctly? The notched ends of the cradle should sit squarely on the pins at the end of the feed roller assemblies. (See Figure 3, #2.)
    - feed rollers jammed? Remove jam.
    - feed rollers bent, damaged? Replace rollers.
    - If cradle is seated correctly and rollers are not jammed or damaged, but paper still tears or folds, and if this is a DWP purchased before October 1983, then replacing the cradle and the front and rear feed rollers at the locations where the folding or tearing occurs may solve the problem. (See p. 7.11 for replacement procedure. Before deciding which sets of rollers to replace, check both sets of rollers by feeding 11 inch paper sideways, to see if rollers on the right side also cause folding/tearing.)
- B. Paper skews to one side and/or develops wrinkles when exiting from platen
  - Make sure paper stacker is correctly seated and thumb screws are tight (see Sheet Feeder User's Manual, p. 4).
  - 2. Make sure platen and cradle are correctly seated.

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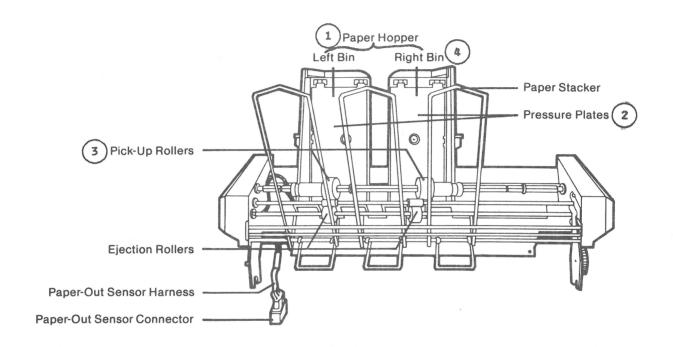


FIGURE 4

#### ADJUSTING THE OUT-OF-PAPER SWITCH

The Out-of-Paper (OOP) switch should cause the DWP to stop printing when the Sheet Feeder hopper is empty or when the paper is jammed. If the OOP switch does not function correctly, try to adjust it before replacing it or swapping out the Sheet Feeder. Use the following procedure.

#### Check the Switch:

- 1. With power off the DWP, remove paper from the Sheet Feeder hopper (Figure 4, #1).
- 2. Push the pressure plates (Figure 4, #2) back until they lock.
- 3. Feed a piece of 14 or 16 lb. paper between the hopper and the pick-up rollers, as if you were going to feed it to the printer by hand. Just before it reaches the platen, the paper passes the OOP switch, and at that point you should hear a "click". Try this several times, pushing the paper down and then pulling it back up. IF YOU DO NOT HEAR THE SWITCH CLICK, continue with this procedure. If you hear a click but the switch still does not work, misadjustment is not the problem see the Troubleshooting section (p. 7.7) for further information.

#### If the switch does not click when paper is installed:

- With the Sheet Feeder removed from the DWP, follow the OOP cable until you locate the OOP switch at the back of the Sheet Feeder.
- Push the right paper bin (Figure 4, #4) as far right as possible, to give yourself room for the next steps.
- Loosen but do not remove the two OOP switch screws, using a small screwdriver.
- 4. Move the OOP switch as you insert and remove a sheet of light paper (14-16 lb.). When inserting/removing the paper causes the switch to click, tighten the screws.
- 5. Install the Sheet Feeder on the DWP, load a small stack of paper, and test whether printing occurs normally when paper is present and stops (and the Attend lamp comes on) when the paper hopper is empty. If so, you have corrected the problem. If not, replace the switch or the entire Sheet Feeder.

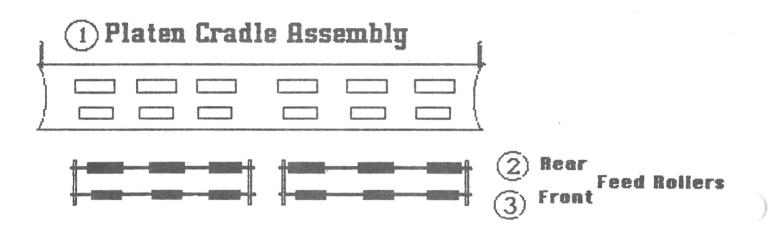


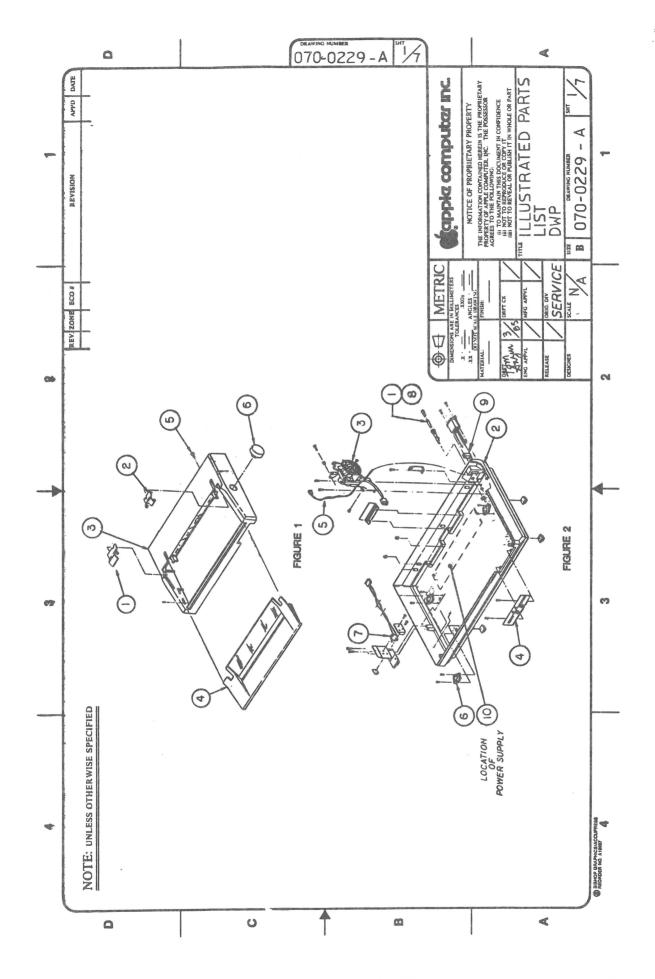
FIGURE 5

#### REPLACING THE DWP PLATEN CRADLE AND FEED ROLLERS

Parts you may need (depending on the situation):

Cradle assembly: P/N 970-0608 (does not include springs) (Figure 5, #1)
Rear feed roller shaft: P/N 970-0015 (Figure 5, #2)
Front feed roller shaft: P/N 970-0014 (Figure 5, #3)

- 1. Disconnect the AC power cord from the DWP.
- 2. Remove the top cover and the platen.
- 3. Lift the cradle gently forward and up off its pins, and rest it upside down on the metal rods behind it.
- 4. To replace either set of feed rollers:
  - a) Grasp the front roller shaft and push gently against one side-plate until the roller shaft comes free.
  - b) Grasp the rear roller shaft and move one side-plate forward while pushing out on it, until the roller comes free.
  - c) Install the new rear (larger) roller shaft first, then the new front (smaller) roller shaft.
- 5. To replace the cradle:
  - a) Start with the cradle in normal position, seated on the feed rollers.
  - b) Use your fingers or a bent paper clip or equivalent to remove the small springs from the sides of the cradle. (Leave the other side of the springs attached to the DWP.)
  - c) Remove the old cradle and put the new one in place. Attach the springs.



DWP Parts List

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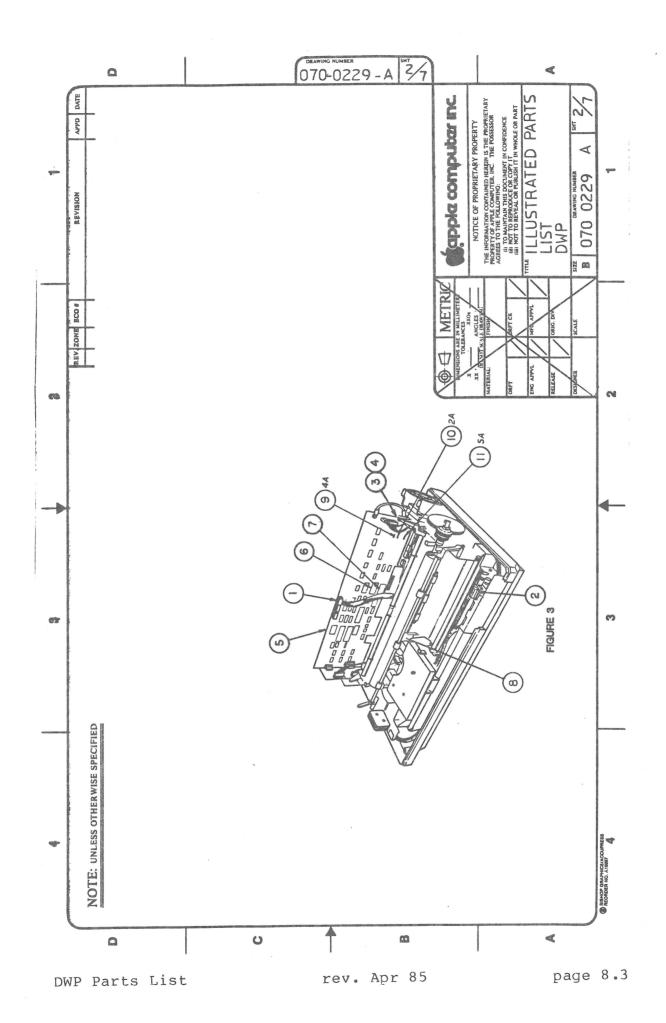
page 8.1

## DAISY WHEEL PRINTER, TOP COVER ASSEMBLY (Figure 1)

Item	Part No.	Description						
1	970-0044	Door, Tractor Cover Left						
2	970-0045	Door, Tractor Cover Right						
3	970-0043	Cover, Top						
4	699-0106	Panel Assembly, Access						
5	970-0624	Screw, Plastic (covers)						
6	970-0002	Knob, Platen						

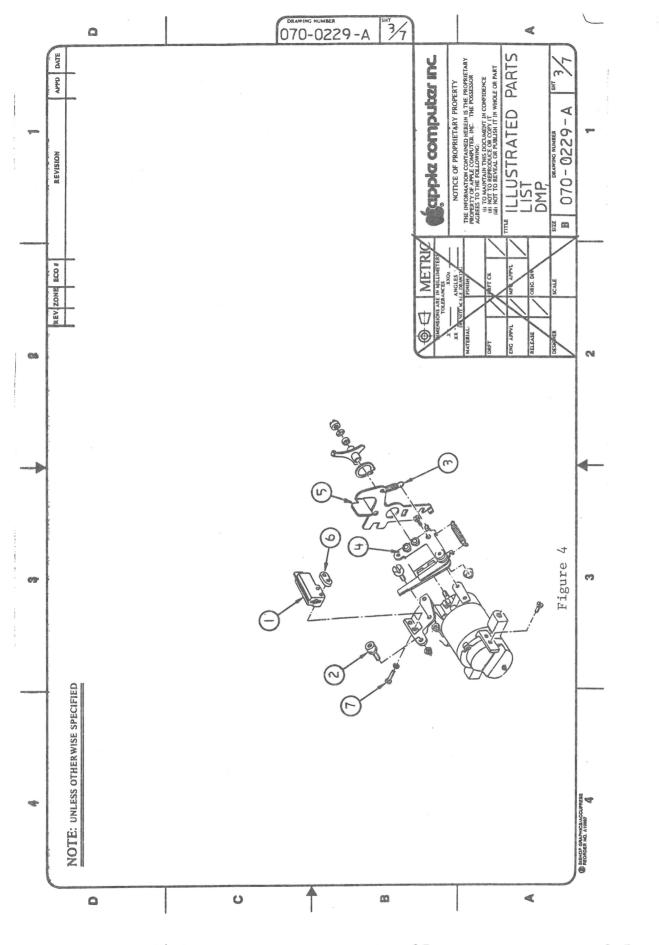
## DAISY WHEEL PRINTER, BOTTOM COVER ASSEMBLY (Figure 2)

1	740-0103	Fuse, 5 Amp 3AG (110V)
2	970-0042	Cover, Bottom
3	970-0038	Fan Assembly, Mini-Intake
4	970-0580	P. C. B., Front Panel Indicator
5	699-0102	Resistor Assembly, Hammer
6	970-0036	Shock Mount
7	970-0037	Switch, Cover Interlock
8	740-0102	Fuse, 3 Amp 3AG (220V),
		(for European DWP)
9	970-0010	Switch, AC Line
10	661-75088	DWP Power Supply, 115V



## DAISY WHEEL PRINTER, PRINTER LAYOUT (Figure 3)

Item	Part No.	Description
1 2 3 4 5 6 7 8 9 10 11	970-0581 970-0582 970-0618 970-0619 661-75087 341-0173 341-0174 699-0103 740-0031 740-0030 740-0032	Cable Assembly, Front Panel DIP Switch, Rocker Type Fastener, Grommet (PCB) Fastener, Plunger (PCB) PCB, Main Logic Card IC, 2764 8K x 8 EPROM (1.7), U43 IC, 2764 8K x 8 EPROM (1.7), U44 Shield Assembly Ribbon Fuse, Pico 4 Amp (F1) Fuse, Pico 2 Amp (F2) Fuse, Pico 5 Amp (F3)



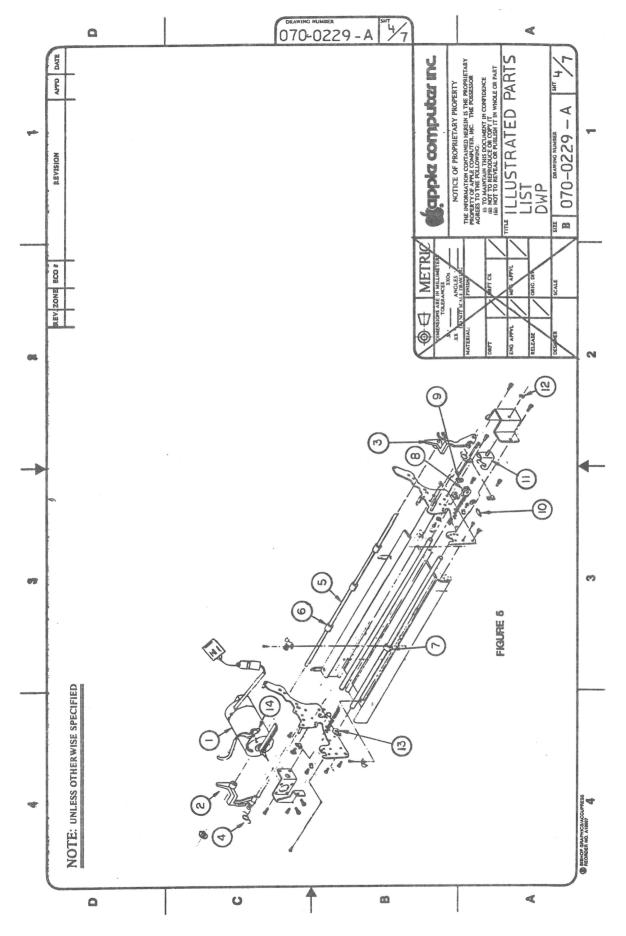
DWP Parts List

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## DAISY WHEEL PRINTER, PRINTWHEEL MOTOR ASSEMBLY (Figure 4)

Item	Part No.	Description
1 2 3	970-0003 970-0013 970-0018	Hammer Assembly complete Bumper, Hammer Armature Spring, Extension (Printwheel Motor Latch)
4 5 6 7	699-0099 970-0022 970-0613 970-0623	Armature, Hammer Assembly Latch, Printwheel Motor Nut Plate, Hammer Screw 3-48 X .625



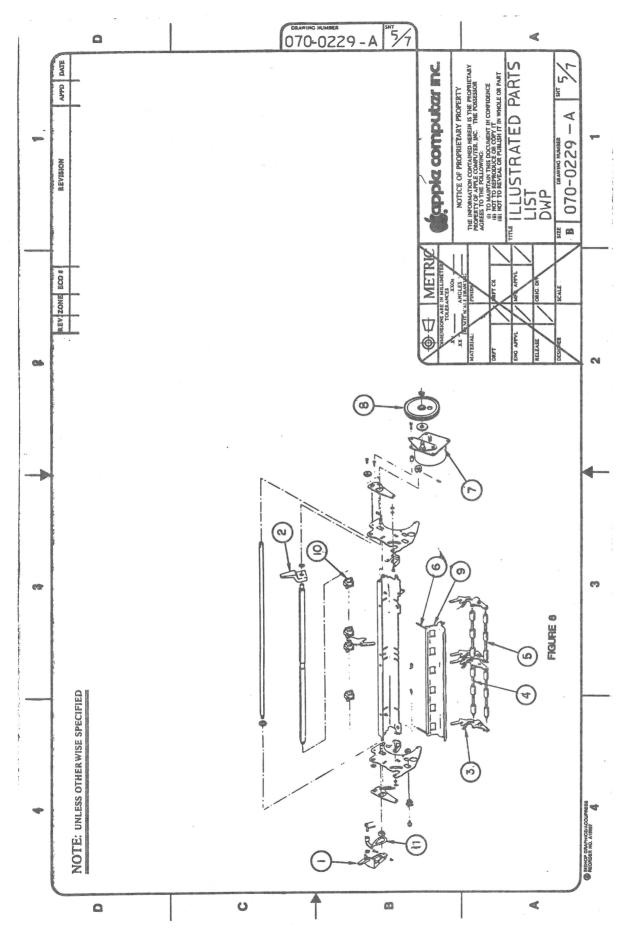
DWP Parts List

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## DAISY WHEEL PRINTER, CARRIAGE DRIVE MECHANISM (Figure 5)

Item	Part No.	Description
1	661-75090	Motor, Carriage Drive complete
2	970-0040	Lever, Paper Bail Left
3	970-0041	Lever, Paper Bail Right
4	970-0622	Spring, Extension (paper bail)
5	970-0031	Shaft, Paper Bail
6	970-0019	Roller, Paper Bail (rubber)
7	970-0030	Bearing, Spherical
8	970-0005	Pulley, Idler Assembly
9	970-0029	Washer, Thrust
10	970-0028	Shaft, Pulley Assembly
11	970-0027	Bracket, Pulley Adjust
12	970-0085	Nut, #8 Hex Lock
13	970-0607	Grip Ring
14	970-0621	Capacitor, Carriage Motor



DWP Parts List

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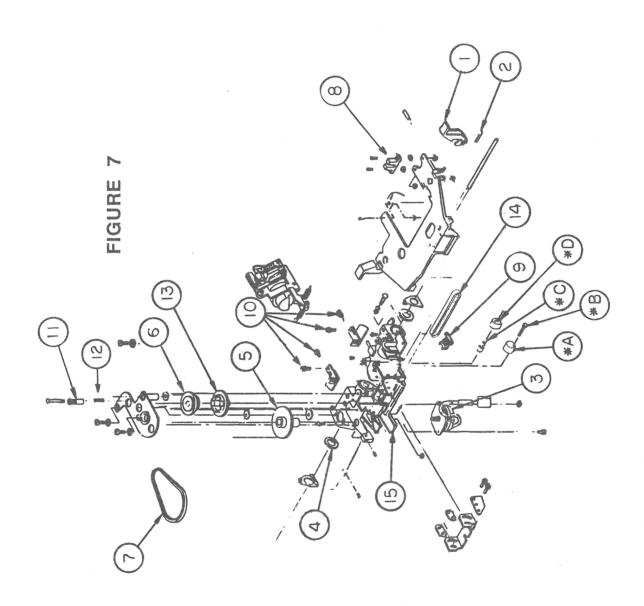
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## DAISY WHEEL PRINTER, PAPER FEED MECHANISM (Figure 6)

Item	Part No.	Description
1 2 3 4 5 6 7 8	970-0026 970-0025 970-0023 970-0015 970-0014 970-0020 699-0104 970-0017	Lever Arm, Impression Control Lever Arm, Feed Roller Release Spring, Extension (feed roller) Shaft, Rear Feed Roller Shaft, Front Feed Roller Spring, Extension (cradle) Stepper Motor, Paper Feed Gear, Platen Idler*
9	970-0617	Cradle Assembly
10	970-0610	Cam Feed Roller
11	970-0606	Spring, Extension (Impression Control Lever)

<sup>\* -</sup> Same as "Gear, Idler Paper Feed"



## DAISY WHEEL PRINTER, CARRIAGE ASSEMBLY (Figure 7)

Item	Part No.	Description
	661-75089	Carriage Assembly, Complete
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15	970-0032 970-0024 970-0034 970-0004 970-0076 970-0079 970-0021 970-0612 970-0614 970-0615 970-0616 970-0617 970-0001 970-0722	Latch, Ribbon Box Spring, Extension (ribbon latch) Stepper Motor, Ribbon Feed Felt Wiper, Carriage Pulley Assembly, Ribbon Rewind Drive Gear, Ribbon Clutch Drive Belt, Ribbon Rewind Photon Module (End of Ribbon) Cleat, Belt Screw 4-40 X 5/16 SEMS Drive Key, Ribbon Drive Spring, Compression (Ribbon Drive Key) Pulley, Timing (Ribbon) Carriage Drive Belt Yoke, Bearing
*A *B *C *D		Eccentric lobe Eccentric screw Eccentric washer Plate, Ribbon Plate Lock

<sup>\*</sup> These parts are now obsolete. If one of them requires replacement, replace all four with the following new parts:

*A	970-0626	Bracket, Ribbon Plate Adjust (lea.); replaces eccentric lobe
*B	970-0625	Screw 6-32 X .562 (2ea.); replaces eccentric screw
* C	970-0628	Washer #6 (2ea.); replaces eccentric washer
*D	970-0627	Plate, Ribbon Plate Lock (lea.); replaces eccentric lobe

#### Apple Daisy Wheel Printer Technical Procedures

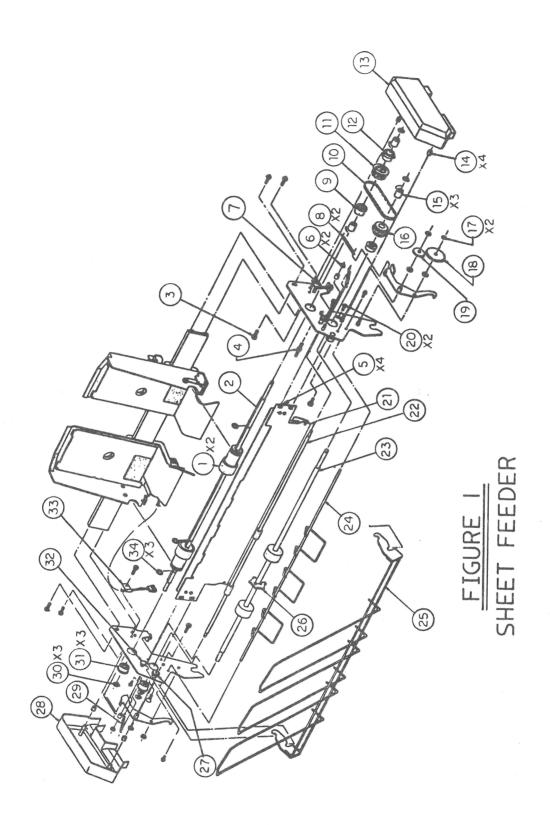
#### Section 9

#### Sheet Feeder Illustrated Parts List

The figures and lists below include all piece parts that can be purchased separately from Apple for the Sheet Feeder, along with their part numbers. These are the only parts available from Apple. Refer to your Apple Service Programs manual for prices.

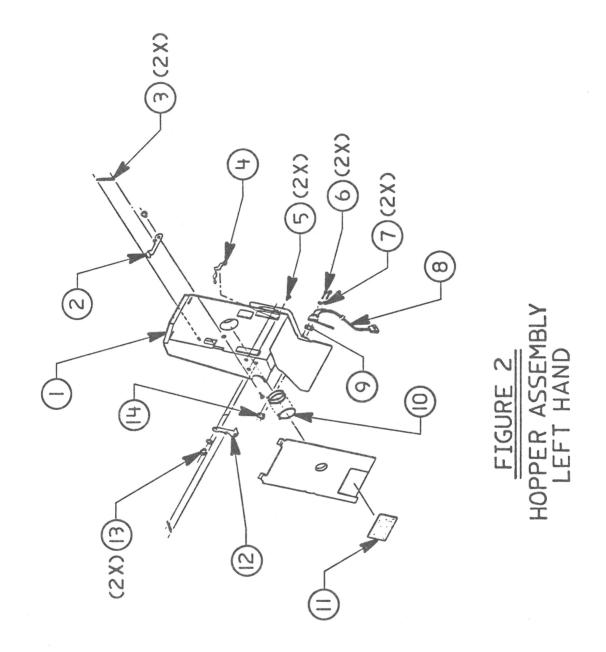
#### Contents:

	Feeder																
Hopper	Assembly,	Left	Hand		• •	 0 0		0 0	• •	 •	 0 0	•	• •	•		. 9	) . 5
Hopper	Assembly,	Right	Han	d		 	• •				 		• (	•	• •	. 9	) . 7



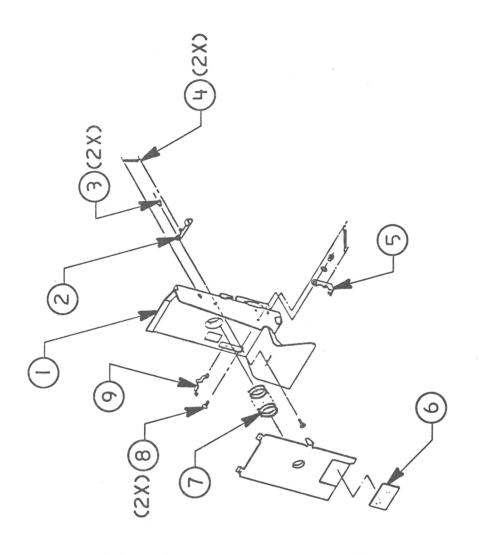
## SHEET FEEDER (Figure 1)

Item	Part No.	Description
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15	970-0693 970-0691 970-0666 970-0702 970-0705 970-0659 970-0503 970-0654 970-0668 970-0688 970-0688 970-0689 970-0680 970-0669 970-0665	Pick-up Roller Assembly Square Shaft Assembly Stud, #8-32 Self-clinch Stud, Pinch Roller Nut, Modified E-Ring, Retainer Stud, Adjusting (foot) Spring Clutch Housing Belt, Timing Pulley Cam Cover, R.H. (Beige) Fastener, #8-18 Clutch Assembly, Roller
16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33	970-0687 970-0660 970-0685 970-0686 970-0672 970-0703 970-0697 970-0698 970-0699 970-0695 970-0682 970-0681 970-0665 970-0663 970-0663 970-0667 970-0661	Cluster, Gear/Pulley E-Ring, Retainer Gear, Platen Gear, Idler Screw, #6-32 x 5/15 Flat Head Paper Guide Assembly Pinch Roller Assembly Ejection Roller Assembly Wire Guide Stacker Roller, Gear Thumb Knob Cover, L.H. (Beige) Spring Grip Ring, Retainer Ball Bearing Stand-off Cable Clamp, Steel E-Ring, Retainer



## SHEET FEEDER - HOPPER ASSEMBLY, LEFT HAND (Figure 2)

Item	Part No.	Description					
1 2 3	970-0674 970-0676 970-0656	Hopper, L.H. Pressure Plate Latch, L.H. Spring, Extension					
4 5	970-0706 970-0670	Spring, Hopper Screw, #4-40 x .187					
6 7	970-0664 970-0657	Lockwasher, Int. Tooth Screw, #2-56 x .437					
8 9	970-0684 970-0671	OOP/Jam Switch Assembly Insulator, OOP Switch					
10 11	970-0694 970-0679	Spring, Compression Cork					
12 13 14	970-0678 970-0696 970-0704	Corner Separator, L.H. Stand-off Nut Plate					



## SHEET FEEDER - HOPPER ASSEMBLY, RIGHT HAND (Figure 3)

Item	Part No.	Description				
1 2 3 4 5 6 7 8	970-0673 970-0675 970-0696 970-0656 970-0677 970-0679 970-0694 970-0670 970-0706	Hopper, R.H. Pressure Plate Latch, R.H. Stand-off Spring, Extension Corner Separator, R.H. Cork Spring, Compression Screw, #4-40 x .187 Spring, Hopper				
9	370-0700	Spring, nopper				

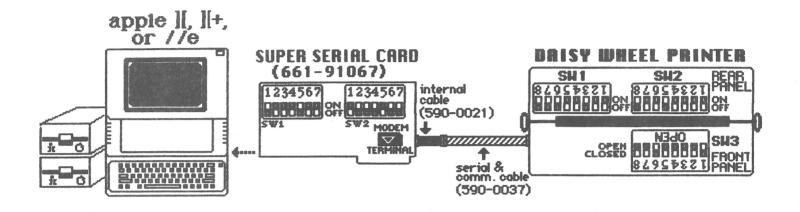
## Apple Daisy Wheel Printer Technical Procedures

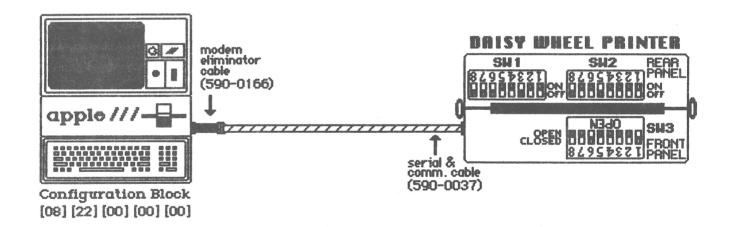
## Section 10

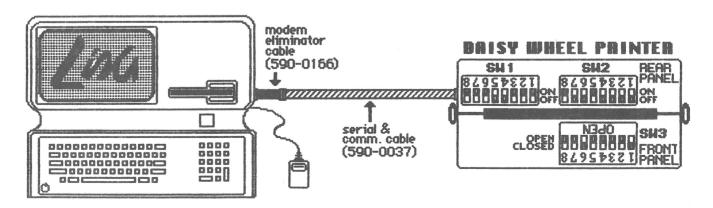
## Appendix

Conte	nts:					
Daisy	Wheel	Printer	Configuration	 	• • • • • • •	10.3

# Daisy Wheel Printer Configuration







DWP Appendix

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#### APPLE SCRIBE PRINTER TECHNICAL PROCEDURES

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Section 3 - Adjustments
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## Scribe Printer Technical Procedures

## Section 1

#### Basics

#### Contents:

What's in This Sectionl.:
Configuration Requirementsl.
DIP Switch Settings
Paper Requirements
Main Logic Board Connector Functions
Printer Self-Test and Loopback Test

#### WHAT'S IN THIS SECTION

This section, Basics, gives you information about paper requirements, DIP switch settings, self-tests, and connector functions that can help you in troubleshooting and general use of the Apple® Scribe® Printer.

#### CONFIGURATION REQUIREMENTS

The Scribe printer uses the same interface cable as the Apple ImageWriter Printer.

In general, software drivers and filters for the ImageWriter will work for the Scribe, but certain features (such as boldface) will not be supported. Some software programs, such as AppleWorks, require a customized driver program for the Scribe printer. (For more information, refer to the "Printers and Printing" chapter in the AppleWorks manual.) Customized print drivers for the Scribe will also offer optimized ribbon use in certain applications.

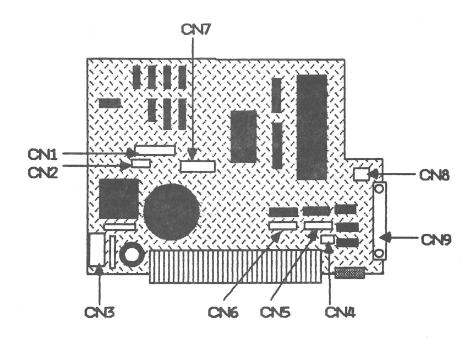
#### DIP SWITCH SETTINGS

The DIP switches are located on the back side of the printer, near the serial interface connector, concealed under a removable cover. The switch cover can be pried off with a small flatblade screwdriver, and the eight numbered switches can be pushed up or down by hand or with a small screwdriver. On the Self Test or Loopback Test, the DIP switch settings are printed out as 1's or 0's in reverse order (87654321), as shown here:

#### DIPSW(00\*00000), '1=0N, 0=0FF'

A 0 indicates that the switch is in UP position (= OFF), a l indicates DOWN position (= ON). Switch 6 is always shown as an asterisk (\*) rather than a l or 0, because it is an electrical switch rather than a firmware control. This does not mean that switch 6 is not functional: together with switch 5, it controls print intensity (see Paper Requirements, below).

A complete table of DIP switch functions and settings is found in the <u>Scribe User's Manual</u>, Part II: Reference, Appendix B.



# Main Logic Board Connector Functions

- CN1 Out-of-Ribbon Sensor,
  Print Head Solenoid
- CN2 Out-of-Paper Sensor
- CN3 Connects to transformer, power supply.
- CN4 Carriage Motor resistor
- CN5 Paper Feed Motor
- CN6 Carriage Motor
- CN7 Control Panel Lights and Switches, Cover Interlock Switch
- CN8 Left Margin (Home Position) Switch
- CN9 Connector to Host Computer (I/O)

#### PAPER REOUIREMENTS

The Scribe printer is a thermal transfer printer: a heated print head, applied to a special ribbon, transfers the ink from the ribbon onto ordinary (non-thermal) paper. Alternatively, the Scribe can be used with thermal paper, with or without a ribbon. Using a ribbon along with thermal paper results in a very sharp black image.

The Scribe works best with smooth paper, 16- to 24-pound weight, such as that used for copying machines. Ordinary pin-feed paper is satisfactory, but coarser grades may cause light and uneven print quality. Print intensity can be adjusted using DIP switches 5 and 6 as follows.

		Switch	Position
For	normal density:	5 6	Up Up
For	low density:	5 6	Up Down

The Scribe can also be used effectively with transparencies. When printing on transparencies, use the following settings:

		Switch	Position
For	normal density:	5 6	Down Up
For	low density:	5 6	Down Down

In general, the Scribe works best with smooth bond paper. a customer complains of print quality problems, the paper being used should be examined first. Always use the optimum bond paper when running tests.

#### MAIN LOGIC BOARD CONNECTOR FUNCTIONS

The diagram on the opposite page shows the functions controlled through the different cables connected to the Main Logic Board.

#### PRINTER SELF-TEST AND LOOPBACK TEST

As a general check of the Scribe printer, a level l technician should run the Loopback Test in preference to the Printer Self-test, because it includes a check of the datasending and -receiving lines and circuits.

#### Printer Self-Test

The Printer Self-test allows the user to verify that the printer is operational. It prints out the ROM revision and DIP switch settings, and produces a print sample that can be used for print quality checks.

To run the Printer Self-test:

- 1. Make sure paper, ribbon, and top cover are installed.
- 2. Hold down the line/form feed button while turning the power on with the power button.

#### Loopback Test

The loopback test is identical to the self-test except that it also checks ROM, RAM, and data-sending and -receiving functions. Whenever you check a printer, run the loopback test to check operation and communications ability. (NOTE: The Loopback Test does not test the "handshaking" ability or setting (DTR or XON/XOFF) of the Scribe; the printer could pass the loopback test and still have faulty handshake circuits.)

To run the loopback test:

- 1. Make sure paper, ribbon, and top cover are installed.
- Connect a loopback connector (a standard DB-25 connector with pins 2 and 3 jumpered) to the serial port on the printer.
- 3. Hold down the **letter** button while turning the power on with the **power** button.

If the printer passes the test, the words "LOOPBACK TEST" will be printed, followed by the ROM revision number, DIP switch settings, and character set printout.

If the printer fails the test, no printing will occur; the select lamp will flash either a RAM check or Loopback error pattern (see Section 4, Troubleshooting, for error lamp display patterns). This will also happen if you try to run the test without a loopback connector installed.

### Disabling the Cover Interlock Switch

Like most printers, the Scribe contains a cover interlock switch that prevents it from functioning when the cover is removed. When you remove the printer cover (see Section 2, Take Apart), you will see the switch to the left of the select and letter switches. To run the Self-test or Loopback Test with the cover off, you can defeat the switch by wedging a piece of rolled-up paper or a similar non-metallic object in the switch opening.

#### Scribe Printer Technical Procedures

#### Section 2

#### Take-Apart

#### Contents:

Removing the Printer Assembly from the Case
(Original Control Panel Version)
Separating the Mechanism Assembly from the
Logic Board Assembly
Removing and Replacing the Logic Board2.9
Connecting the Logic Board Assembly to the
Mechanism Assembly
Replacing the Power Switch2.15
Removing and Replacing the Print Head
Control Panel Upgrade

#### IMPORTANT: There are two existing control panels for Scribe:

- On the original one-piece control panel, the logic board cable is soldered to the panel, shielded with copper to pass RFI tests, and threaded through guides along the inside perimeter of the cover.
- 2. On the newer two-piece control panel there are two separate parts:
  - a. The control panel itself (connected to the cover), which has a short cable and connector soldered to it.
  - b. The logic board cable, which is mounted to the front of the mechanism assembly and runs underneath it to the logic board. When you exchange a mechanism assembly, this cable must be returned with the mechanism assembly module.

The take-apart procedures which follow are based on the original one-piece control panel configuration. For additional procedures specific to the newer two-piece control panel, see Control Panel Upgrade in this section.

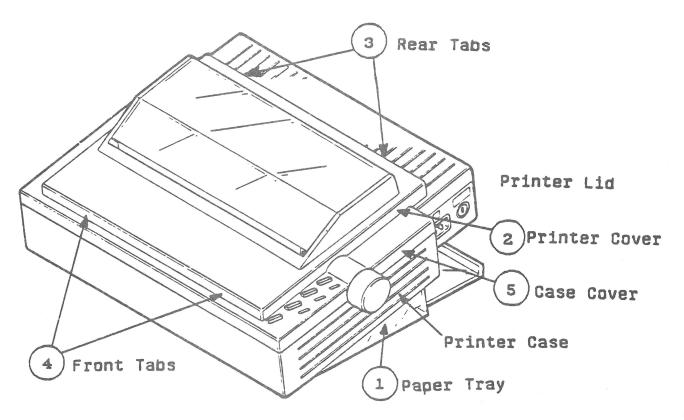


Figure 1

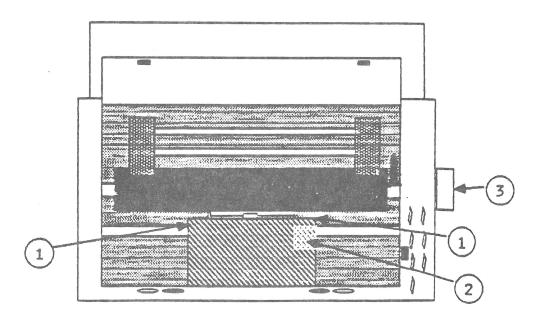


Figure 2

#### REMOVING THE PRINTER ASSEMBLY FROM THE CASE

Required Tools: medium Phillips screwdriver (magnetized)

small flatblade screwdriver

needlenose pliers

magnetic pick-up device or tweezers

foam workpad or equivalent

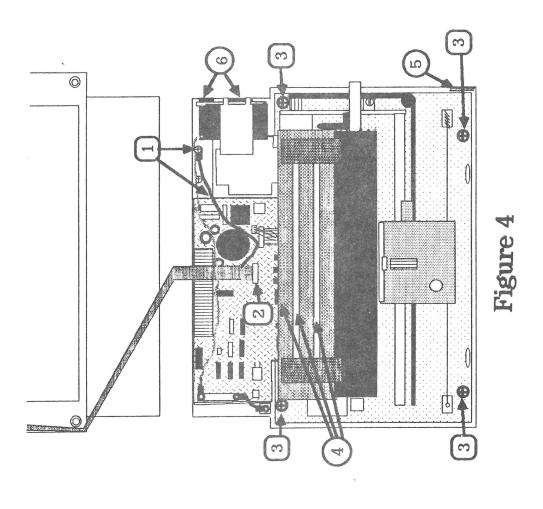
IC extractor (Apple P/N 918-0017)

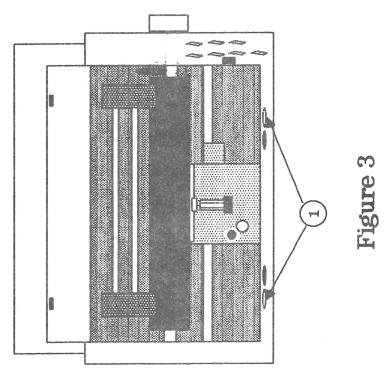
Before you can perform any repairs or adjustments on the Scribe Printer, remove the printer assembly from the case according to the following instructions. NOTE: In all instructions that refer to "left" and "right," we assume that you are facing the front of the printer, where the Apple logo appears.

- 1. Turn off the power switch and remove the AC power cord from the printer.
- Remove any paper from the printer, and lift the printer off the paper tray (Figure 1, #1) (if present).
- 3. Remove the translucent printer cover (Figure 1, #2) as follows:
  - a) Press forward on the back panel of the printer cover and lift it to free the two tabs in back (see Figure 1, #3).
  - b) Pull the cover slightly toward the back and up (to free the tabs in front - see Figure 1, #4).
- 4. Remove the ribbon cassette as follows:
  - a) Place your index fingers under the ribbon cassette, with one finger on each side, close to the platen (see Figure 2, #1).

CAUTION: The ribbon sensor is hidden under the cassette (see Figure 2, #2). Be sure that the finger on the right is under the cassette and not under the ribbon sensor.

- b) Lift up with your fingers until the cassette pops out. Then remove it from the printer.
- 5. Pull the platen knob (Figure 2, #3) off the platen shaft.
- 6. Remove the case cover (Figure 1, #5) as follows:





Scribe Printer Take-Apart

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- a) Turn the printer over onto the workpad and remove the two screws on the bottom of the case.
- b) Hold the case together and turn it right side up.
- c) Free the ground wire from the right front corner of the baseplate by pushing on its connector with a screwdriver or needlenose pliers.
- d) Locate the two tabs inside the front of the case (see Figure 3, #1). Notice the slots above the tabs on the inside of the front cover. To free the cover, push forward through the left slot with a small screwdriver while lifting up on the left corner of the printer cover. Repeat for the right tab.
- e) Lift the front of the case cover up, pull the cover off its rear tabs, and lay it upside down behind the case; DON'T STRAIN THE RIBBON CABLE that connects the cover to the case.
- f) Locate the ground wire that connects the ribbon cable to the rear of the chassis (Figure 4, #1). Free it from the chassis by removing the screw. IMPORTANT: Keep this screw with the ground wire. It is longer than the other chassis screws.
- g) Disconnect the ribbon cable from the logic board by pulling on the connector, not on the cable. (See Figure 4, #2.)
- h) Set the case cover aside.
- 7. Remove the four baseplate screws (Figure 4, #3).
- 8. Remove the printer assembly from the case as follows:
  - a) Push the little grey cable-clamp out of the way (Figure 4, #5).
  - b) Grasp the assembly by the two metal rods and the back plate (Figure 4, #4) and lift it up, right side first, out of the case. (You may have to free the AC fuse holder and the power cord socket (Figure 4, #6) by prying outward on the case with a screwdriver or fingers as you begin lifting.)
  - c) Place the printer assembly on a stable work surface and set the case aside.

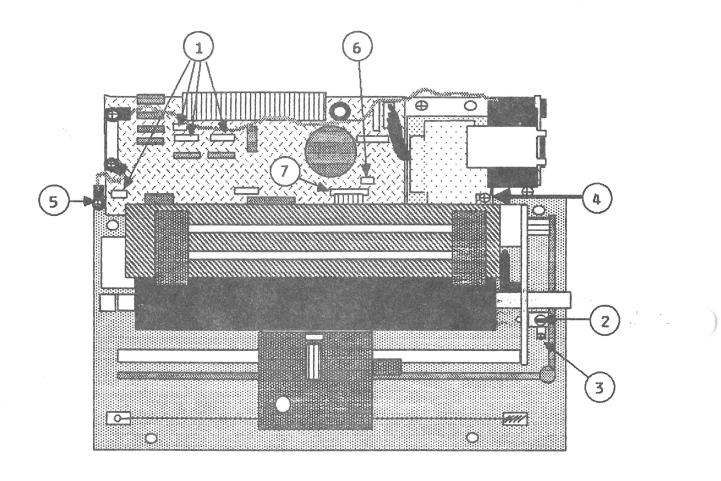


Figure 5

## SEPARATING THE MECHANISM ASSEMBLY FROM THE LOGIC BOARD **ASSEMBLY**

- Disconnect the cables from the four leftmost sockets on 1. the logic board (Figure 5, #1). Remember to pull on the cable connectors, not on the wires.
- Remove the power switch (Figure 5, #2) from the right 2. side of the mechanism assembly as follows:
  - a) Remove the screw at the base of the power switch (Figure 5, #3).
  - b) If you push the switch to the right, you will notice that it is held to the mechanism by a twisted metal tab. Use needlenose pliers to straighten the tab, and then push the switch free.
  - c) Carefully disengage the switch wires from their three plastic clamps and rest the switch near the logic DO NOT STRAIN THE SWITCH WIRES.
- Remove the screw just to the right of the transformer (Figure 5, #4).
- Remove the small screw at the far left that connects the mechanism assembly to the electrical assembly (Figure 5, #5).
- Separate the two assemblies slightly by sliding the logic board away from the mechanism assembly, about one inch. Don't strain the cables that still connect the two assemblies.
- 6. Disconnect the cable next to the flat mylar cable (Figure 5, #6).
- Disconnect the flat mylar print head cable (Figure 5, #7) from the logic board as follows:
  - a) Using the IC extractor, pull up the ceramic cableholder about 1/8 inch (Figure 5, #7) to release the cable. DO NOT FORCE IT; DO NOT PULL THE CONNECTOR OFF. Be careful not to damage the mylar cable.
  - b) Pull the mylar cable out of the cable-holder. IT SHOULD SLIDE OUT EASILY: if it resists, pull the cable-holder up further. DO NOT FORCE THE CABLE.
- 8. Slide the assemblies apart.

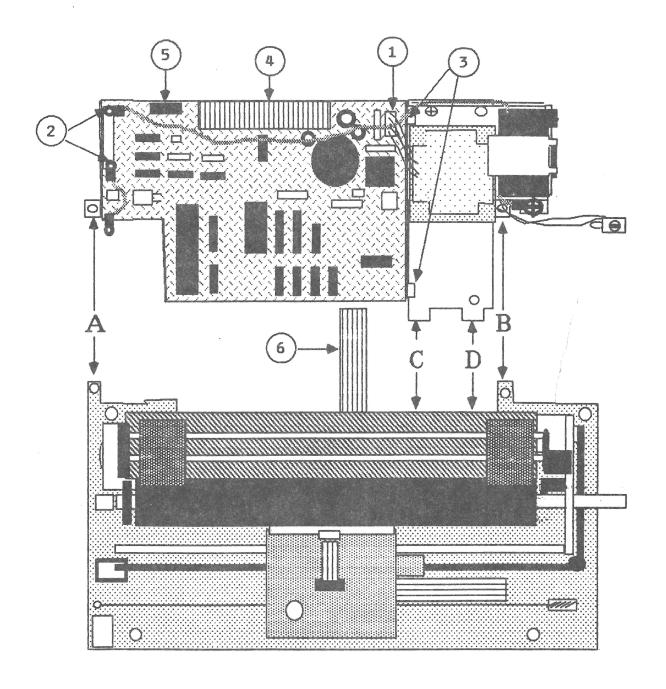


Figure 6

#### REMOVING AND REPLACING THE LOGIC BOARD

#### Remove

- Disconnect the four-wire transformer plug from the logic board (Figure 6, #1).
- 2. Remove the two screws from the DB25 connector (Figure 6, #2) and set the ground wires aside.
- 3. Slide the logic board out from the small plastic clamps that hold it (Figure 6, #3), and set it aside.

# Replace

- 1. Slide the new logic board into the plastic clamps.
- 2. Line up the holes at the sides of the DB-25 connector with the screw holes in the baseplate.
- 3. Insert and fasten the DB-25 connector's screws with the ground wires under them, as follows:
  - a) The long ground wire from the right goes to the rear of the DB-25; route it in front of the heat sink (Figure 6, #4) and the DIP switches (Figure 6, #5).
  - b) The short ground wire (which you removed) goes to the front of the DB-25.
- 4. Connect the four-wire transformer plug to its socket (Figure 6, #1).

## CONNECTING THE LOGIC BOARD ASSEMBLY TO THE MECHANISM ASSEMBLY

- 1. Lay the Logic Board Assembly behind the Mechanical Assembly on a flat surface. (See Figure 6.)
- 2. Move all cables out of the way, so that none will be pinched or hidden when you push the assemblies together.
- 3. Make sure the mylar cable (Figure 6, #6) is lying on top of the logic board.
- 4. Slide the two assemblies together, making sure that Tabs A and B of the logic board lie under Tabs A and B of the mechanism assembly (see Figure 6).

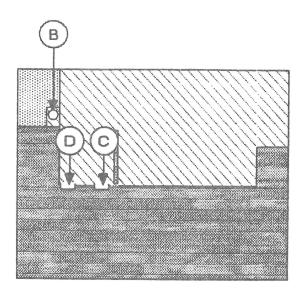


Figure 7

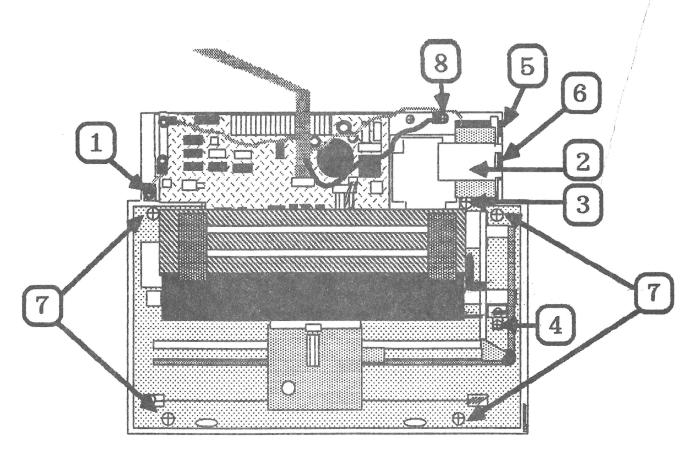


Figure 8

- IMPORTANT: Lift up the two assemblies to make sure that tabs C and D on the logic assembly baseplate fit fully into slots C and D on the mechanism assembly baseplate (see Figure 7), and that tab B is correctly seated over its threaded hole. If the tabs are not correctly seated, repeat step 4.
- Insert and tighten the small screw at the far left, with the short ground wire under it (Figure 8, #1).
- Insert and tighten the screw next to the transformer (Figure 8, #3). You may have to move the noise filter and wires out of the way (Figure 8, #2 -- nothing is holding them down except friction).
- Reconnect the mylar cable as follows:
  - a) Lift the ceramic cable-holder to full upward position (use fingers or IC extractor).
  - b) Hold the mylar cable as close to its end as possible, and insert it as far as it will go into the ceramic cable-holder.
  - c) Push down the ceramic cable-holder to lock the cable in position.
  - d) Gently tug on the mylar cable to test that it is held firm. If it moves, repeat steps a through c and test again.
- Reconnect the five other cables (all except the ribbon cable) to the logic board. They are keyed by size and color so that you can see where they go.
- 10. Put the power switch back into place, reroute its wires under their three clamps, insert its tab into the proper slot, and refasten its screw (a small one) (see Figure 8, #4).
- Retwist the tab on the power switch just enough to hold
- Holding the printer assembly by the metal bars, lower it 12. into the case, left side first, so that the DB25 connector slides into its slot first. (You may have to bend the front tabs out of the way to do this).
- Make sure the AC fuse holder and the AC power cord socket (Figure 8, #5 and #6) fit into their slots in the case. If they don't, push them gently into place.

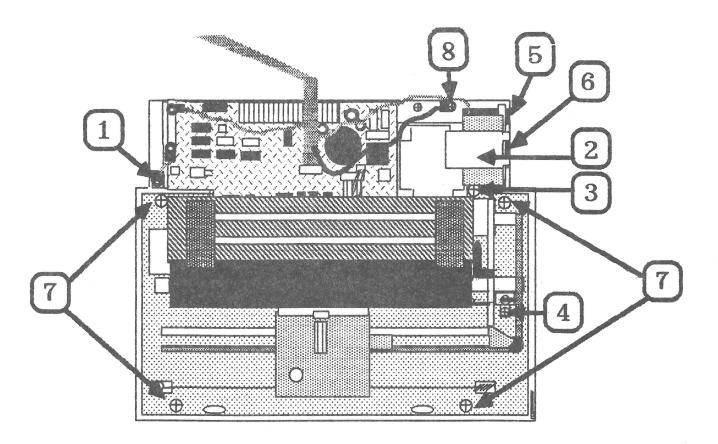


Figure 8

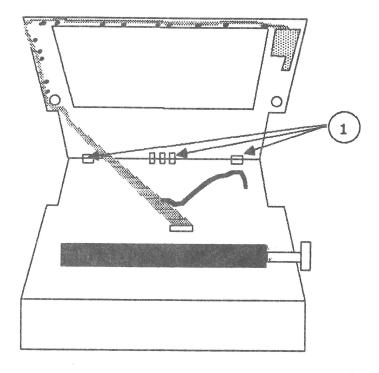


Figure 9

Replace and tighten the four screws at the corners of the black base-plate (Figure 8, #7). NOTE: These screws are all the same length. The similar but longer screw will be used later.

CAUTION: Be careful not to catch any wires under the screw at the left rear.

- Make sure the ribbon cable in the case cover is seated 15. behind the posts along the inner edge of the case cover. (See Figure 9.)
- Plug the ribbon cable into the logic board. 16.
- Fasten the ribbon cable's ground wire to the right rear corner of the chassis with the long screw (Figure 8, #8).
- Replace the case cover as follows: 18.
  - a) Rest the back edge of the case cover on the back edge of the case, so that the tabs on the back edge of the cover are positioned properly (see Figure 9, #1).
  - b) Lower the front of the case cover so that the back tabs catch. Be careful not to pinch any loose cables between the case cover and the case.
  - c) Connect the ground wire at the right front of the baseplate and tuck it under the small grey clamp on the side of the case.
  - d) Push the front of the case cover onto the two front tabs until they click into place and hold it firmly. (You will have to push hard.)
  - e) Holding the case together, turn it upside down.
  - f) Replace the two screws in the bottom of the case.
  - g) Turn the case right side up.
- 19. Reinstall the platen knob.
- 20. Reinstall the ribbon cassette.
- Reinstall the paper cover, front tabs first. 21.
- Place the printer on the paper tray.

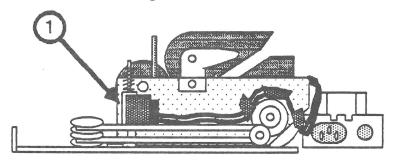
### CONTINUED ON NEXT PAGE

- 23. Install paper and run a self-test as follows:
  - a) Make sure the power switch is in OFF position (up).
  - b) Connect the power cord.
  - c) Press the line/form feed switch and hold it down while pushing the power switch down. When the Scribe starts printing, release the line/form feed switch.

The self-test will run until you turn the power off.

If the self-test will not run, re-open the case and check to make sure that you have correctly reinstalled all cables.

If the printer still does not function correctly, refer to Section 4, Troubleshooting.



Right side of printer assembly

# Figure 10

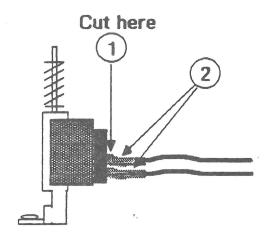


Figure 11

#### REPLACING THE POWER SWITCH

Recommended Tools:

Needlenose pliers

Medium Phillips screwdriver

Diagonal cutters

X-acto knife

Heat-shrink tubing (3/16 inch diameter)

Soldering iron

60/40 rosin-core solder

Wire strippers

Heat gun

- Remove the printer assembly from the case. (See procedure, above in this section.)
- 2. Remove the power switch (Figure 10, #1) from the right side of the printer assembly as follows:
  - a) Remove the screw at the base of the power switch.
  - b) If you push the switch to the right, you will notice that it is held to the printer by a twisted metal tab. Use needlenose pliers to straighten the tab, and then push the switch free.
  - c) Carefully disengage the switch wires from their three plastic clamps.
- 3. Cut the leads free from the faulty switch (see Figure 11, #1). NOTE: Cut the leads as close to the switch as possible.
- 4. Remove and discard the old shrink tubing (Figure 11, #2).
- 5. Strip about 3/8 inch of new wire on each lead.
- 6. Put a 3/4-inch length of new shrink tubing on each lead.
- 7. Attach the leads to the terminals of the new switch (either lead to either terminal) as follows:
  - a) Twist and tin a lead.
  - b) Insert the lead through the hole in either terminal.
  - c) Crimp the lead to ensure a good mechanical connection.
- 8. Solder the leads to the terminals.
- Push the shrink tubing forward so that it covers the solder joint, and heat it with the heat gun until it shrinks to a snug fit around the joint.

- 10. Reroute the leads under the three plastic clamps and put the new switch in place.
- Reinstall the screw at the base of the switch, put the tab through its slot in the side plate, and put a slight twist in the tab to hold the switch in place.
- 12. Reassemble the printer and run the Loopback test to check the repair.

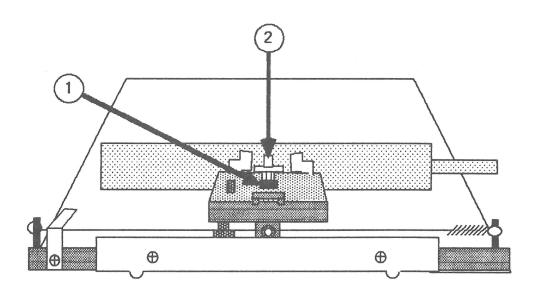


FIGURE 12

#### REMOVING AND REPLACING THE PRINT HEAD

#### Remove

- Turn the power on to center the print head, then turn the power back off.
- 2. Follow steps 1 through 6 of "REMOVING THE PRINTER ASSEMBLY."
- Grasp the print head connector (Figure 12, #1) by the sides and progessively pull up to disconnect it. Rocking the connector back and forth as you lift will make it easier to remove.
- Grasp the print head (Figure 12, #2) by the sides and pull up to disconnect it.
- 5. Remove the rubber cap from the top of the print head connector. Put the cap in a safe place -- you will have to install it over the new print head's connector.

## Replace

- Install the rubber cap from the old print head connector over the new one.
- Holding the print head by the sides, lower it into the grooves located at the front of the ribbon cassette holder. (See Figure 12.)
- Carefully reconnect the print head connector to the circuit board connector at the center of the ribbon cassette holder. (See Figure 12, #2.)
- Follow steps 18 through 22 of "CONNECTING THE LOGIC BOARD ASSEMBLY TO THE MECHANISM ASSEMBLY." (See page 2.13.)
- Perform a Self Test to make sure that the Scribe is fuctioning properly. (See Section 4, Troubleshooting.)

#### CONTROL PANEL UPGRADE

As noted at the beginning of this section, there are two existing control panels for Scribe. In the one-piece control panel (original) version, the cable is soldered to the control panel, shielded with copper to pass RFI tests, and threaded through guides around the inside perimeter of the cover.

In the newer control panel version, the cable is separate from the control panel. It is mounted instead to the front of the mechanism assembly and runs underneath it to the logic board. This cable is attached to the mechanism assembly with double-sided tape. When you exchange a mechanism assembly this cable must be returned with the mechanism assembly module.

New (purchased from stock) or exchange mechanism assemblies will have the cable attached or the Upgrade Assembly will be included. If the Upgrade Assembly is included, then install it on the mechanism assembly. The Upgrade Assembly contains the cable and a nut, bolt, and clip to hold the cable in place on the mechanism assembly.

There are two possible situations which involve the Upgrade Assembly when the mechanism assembly is exchanged:

- If the customer's printer has the original control panel installed, ignore the cable installed under the exchange mechanism assembly (but make sure it is disconnected from the logic board). Connect the original control panel cable to the logic board.
- If the customer's printer has the new control panel installed, simply connect the new control panel to the cable mounted on the mechanism assembly and connect the other end of the cable running underneath the mechanism to the logic board.

NOTE: Be sure to install the Upgrade Assembly on the mechanism assembly. Both are included in the Spares Kit.

# Scribe Printer Technical Procedures

# Section 2: Take-Apart

# Appendix A: Optional Procedures

# Contents:

Replacing	the	Ribbon	Drive	Wir	е.	0 0		0 0	 			 0	0 0		.2A.3
Replacing	the	Drive D	Belt				0 0		 					0	.2A.7

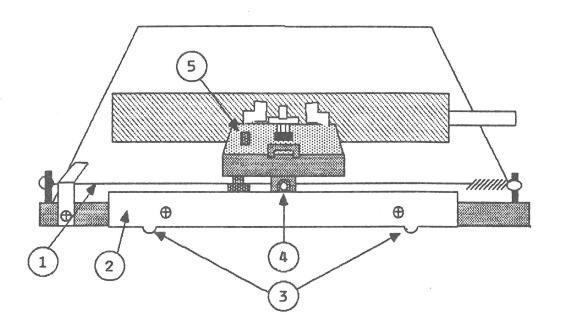


Figure 1

#### REPLACING THE RIBBON DRIVE WIRE

Required Tools: medium Phillips screwdriver

NOTE: This procedure is optional at Level 1.

The ribbon drive wire (Figure 1, #1) is a thin, clear nylon filament, like fishing line, that turns a pulley to advance the ribbon as the carriage moves. If it breaks or becomes otherwise unusable, replace it as follows.

#### To Remove:

- Remove the printer assembly from the case (see Take-Apart procedures).
- Remove the front guide bar (Figure 1, #2) from the mechanism assembly by removing its two screws.

IMPORTANT: Before removing the ribbon drive wire, note how it is routed around the ribbon drive pulley underneath the carriage assembly.

- Grasp the spring at the right of the ribbon drive wire and remove it from its post.
- Remove the spring from the wire.
- 5. Remove the wire from the pulley.
- 6. Remove the left side of the wire from its post.

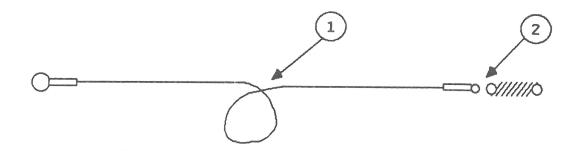


Figure 2

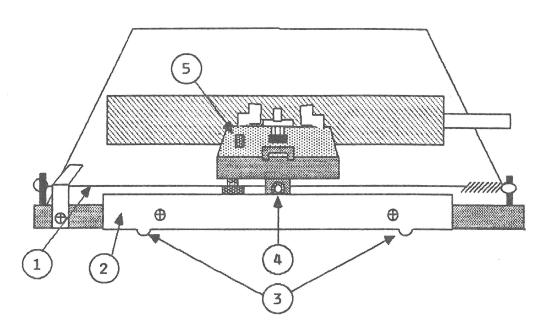


Figure 1

## To Replace:

- Hook the large end-loop on the wire around the left post. Make sure the end-loop fits into the slots on the post.
- Make a loop in the wire (see Figure 2) and fit it around the ribbon drive pulley beneath the carriage assembly. Make sure the crossover in the loop (Figure 2, #1) is at the rear of the pulley.
- Pull the wire taut, so that it stays in place around the pulley.
- Hook the smaller end-loop of the new wire through one 4. hook of the spring. (See Figure 2, #2.)
- Hook the spring to the right-hand post. Make sure the spring fits into the groove in the post.
- Make sure the wire and spring look straight on both 6. sides. If not, adjust them.
- Replace the front guide bar as follows: 7.
  - a) Rest the front roller of the carriage assembly on top of the front guide bar. (See Figure 1, #4.)
  - b) Line up the tabs on the guide bar (Figure 1, #3) with the tabs on the baseplate of the mechanism assembly.
  - c) Replace and tighten the two screws in the front guide bar.
- To check that the installation was correct, press the print head against the platen with your finger while you move the carriage assembly across its track. The ribbon drive capstan (Figure 1, #5) should turn as the carriage moves from left to right. If it doesn't, readjust the wire.
- Replace the printer assembly in the case (see procedure above).

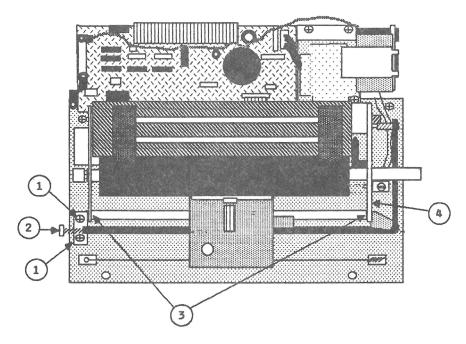


Figure 3

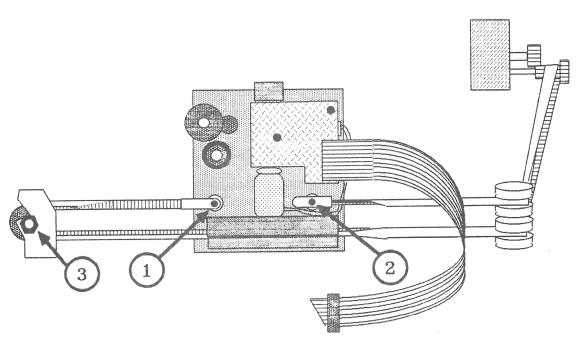


Figure 4

## REPLACING THE DRIVE BELT

Required Tools: Medium Phillips screwdriver
5.5 mm nut driver or wrench, or
small adjustable wrench

NOTE: This procedure is optional at Level 1. In any case, it should only be necessary if the belt is cut or otherwise damaged.

- 1. Remove the printer assembly from the case.
- 2. Loosen the drive belt as follows:
  - a) Loosen the two screws that hold down the belt tension bracket (Figure 3, #1).
  - b) Loosen the belt tension screw (Figure 3, #2) as far as possible without removing it.
- 3. Remove the front guide bar and ribbon drive wire (see Replacing the Ribbon Drive Wire, above.)
- 4. Remove the screws from the ends of the carriage shaft (Figure 3, #3).
- 5. Move the carriage assembly all the way to the left.
- 6. Lift the right end of the carriage shaft out of its socket. (You will have to push outward on the side plate. See Figure 3, #4.)
- 7. Slide the carriage shaft out from the carriage assembly and completely out of the machine.
- 8. Slide the carriage assembly to the middle of its track.
- 9. Remove the two clear plastic paper guides and the print head. (To remove them, pull up with a wiggling motion.)
- 10. Lift the near edge of the carriage assembly up and rest the assembly on its print-head side, so that its underside is facing you. (See Figure 4 for a view of the underside of the carriage assembly.)
- 11. Remove the screws from the two ends of the belt (Figure 4, #1 and 2).
- 12. Loosen the nut on the left-hand belt pulley (Figure 4, #3); then pull the pulley out of its holder and remove the belt. IMPORTANT: Be careful not to lose the pulley's washers.

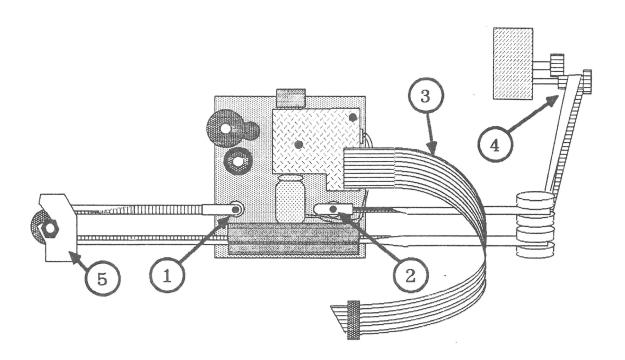


Figure 5

## Installing the New Belt

- Attach either end-piece of the new drive belt to the right-hand mounting hole in the carriage assembly (Figure 5, #2) as follows:
  - a) Hold the belt so that the smooth side faces up.
  - b) Align the hole near the midpoint of the belt endpiece with the right-hand mounting hole in the carriage assembly (see Figure 5, #2).
  - c) Insert and tighten the screw, being careful not to pinch any wires.
- Route the belt as in Figure 5: 2.
  - behind the wide plastic cable (Figure 5, #3);
  - over the upper pulley on the right side (give the belt one 90° turn so that the ridges on the belt engage the ridges on the pulley);
  - around the carriage drive pulley (Figure 5, #4);
  - back over the lower right-hand pulley;
  - under the carriage assembly (with ridged side up);
  - and through the left hand pulley bracket (Figure 5, #5) (from which you removed the pulley).
- Replace the left-hand pulley in its slot. The small 3. washers on each side go inside the slot. The large washer goes on the outside at the front, under the nut.
  - IMPORTANT: Do not overtighten the nut. If you do, it may cause a home position error.
- Route the loose end of the belt around the pulley, and line up the end-piece of the belt with the left hand mounting hole on the carriage assembly (see Figure 5, #1). (You will have to turn the belt 90° so that the ridges on the belt face toward you and the hole at the end of the end-piece lines up with the mounting hole.)
- 5. Attach the end-piece to the carriage assembly.
- 6. Turn the carriage assembly right side up and move it all the way to the left.

- 7. Put the carriage shaft back through the carriage assembly. (The small rubber bumper goes to the right side.)
- 8. Fit the carriage shaft into its sockets and replace the two screws that hold it in place.
- Replace the ribbon drive wire and front guide bar (see 9. above).
- 10. Replace the print head (including the rubber cap on its connector) and the plastic paper guides.
- Adjust the drive belt tension (see Section 3, 11. Adjustments).
- Move the carriage assembly back and forth along its track, observing to make sure that it is correctly installed.

#### DRIVE BELT TENSION ADJUSTMENT

Required Tools: spring gauge (P/N 077-0014 or equivalent)

Metric ruler

5.5 mm nutdriver or wrench, or small adjustable wrench Medium Phillips screwdriver

The Scribe Printer often produces a small horizontal registration error (a slight unevenness line-to-line) at column 0 (the left margin). This unevenness is difficult to remove and should be considered normal. Horizontal registration errors (uneven vertical lines) elsewhere on the page are not acceptable and are correctable by adjusting the belt tension.

Faulty drive belt tension can also cause home position errors (see Section 4, Troubleshooting, p.4.6-4.8 for error indications). In the case of a home position error, make sure that the home position sensor switch (Figure 1, #1) is firmly attached to the chassis before you try the belt tension adjustment. If there is any play in the sensor switch mounting, tighten the screw. This may solve the problem without belt tension adjustment.

### To Measure Belt Tension:

- Remove power from the printer and disconnect the power
- 2. Remove the printer cover.
- 3. Move the carriage assembly all the way to the right.
- Position the spring gauge on the top portion of the drive belt, halfway between the carriage assembly and the left-hand belt pulley. (See Figure 1, #2.)
- Press down on the drive belt with the gauge until the top of the belt is 10 millimeters (about 3/8 inch) from the bottom plate of the printer (see Figure 2). spring gauge should read between 1/4 and 1/2 pound (175  $g_{i} + or - 25 g_{i}$
- If the spring gauge reading is outside that range, tighten or loosen the belt according to the steps below.

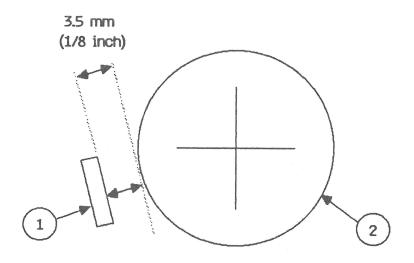


Figure 5

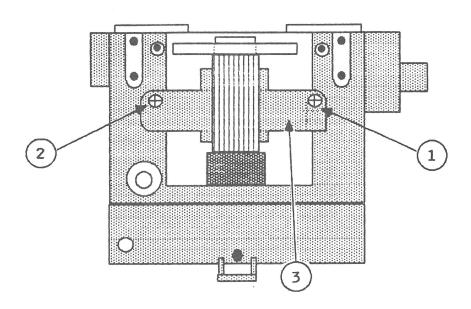


Figure 6

#### PRINT HEAD ADJUSTMENT

If the print head is too far from the platen, printing will be uniformly light. If it is too close, printing may be too black and overlaid with a grey smear.

## Measuring the print head gap

- 1. Remove the ribbon cassette from the printer.
- 2. Remove the clear plastic paper guide from the left-hand side of the carriage assembly (it pulls off).
- Measure the distance between the print head (Figure 5, #1) and the platen (Figure 5, #2). The gap should be 3.5 mm, + or - 0.5 mm (about 1/8 inch).

# Adjusting the print head gap

- Remove the ribbon cassette from the printer.
- Loosen but do not remove the adjustment screw on the right (Figure 6, #1).
- Loosen the left-hand screw (Figure 6, #2) just enough to allow movement of the print head positioning plate (Figure 6, #3). (It pivots at the left side and moves at the right.)
- Move the print head forward or back until the gap is 4. correct (3.5 mm or 1/8 inch).
- 5. Tighten the screws.
- Measure again to verify adjustment. Read just if 6. necessary.
- Run the self-test to verify that the adjustment has solved the problem. Read just if necessary.
- Make sure to reinstall the clear plastic paper guide when you finish.

# Scribe Printer Technical Procedures

## Section 4

# Troubleshooting

# Contents:

Initial Checks			 4	3
Self-Test			 4 . !	5
Instructions for Using th	ne SYMPTO	M TABLES	 4 . !	5
Symptom Tables (Error Cor	nditions)		 4	7
Symptom Tables (Print Qua	ality Pro	blems)	 4 . 9	9
Symptom Tables (Abnormal	Printer	Operation)	 4	11

NOTE: The Scribe printer should be tested the Apple II Peripherals Diskette. (See Multi-Product Diagnostics Technical Procedures, Section 1.)

To troubleshoot the SCRIBE printer, first perform the Initial Checks below; then if the problem is not found, try running the self-test and use the SYMPTOM TABLES to diagnose the problem. All repairs must be verified by passing the self-test.

### INITIAL CHECKS

Inspect everything visually, including: Power Cord insulation cracks (if available) evidence of burning misformed from excessive bending ground plug missing from power cord Printer Case burn marks case has been opened by user evidence of having been dropped (cracks in case, paper tray, or cover) no ribbon installed Ribbon Cassette out of ribbon ribbon torn ribbon drive cable broken Print Head print head appears damaged print head cable incorrectly installed Platen platen dirty or damaged labels stuck on platen paper or labels stuck in feed path

#### SELF-TEST

- 1. Make sure paper is installed; press and hold down the LINE/FORM FEED key on the control panel and then turn the power on. The printer should print a repetitive alphanumeric pattern.
- 2. If the self-test does not pass or if the print quality is poor, note the symptoms and go to the SYMPTOM TABLES

### INSTRUCTIONS FOR USING THE SYMPTOM TABLES

Equipment Required:

Phillips screwdriver flatblade screwdriver needlenose pliers

ruler

loopback connector

IC extractor (Apple PN# 918-0017) Tension gauge (Apple PN# 077-0014)

#### Procedures:

- 1. Locate the symptom in the tables that most nearly matches the observed symptoms of the printer being repaired.
- Perform the corrective actions, in the sequence listed, until the failure has been diagnosed and repaired. If the problem is not found using the corrective actions given, locate another symptom that is similar, and follow the corrective actions for that symptom.
- 3. If the symptoms you observe are not found in the tables, replace the logic board (it can cause the greatest variety of symptoms).

The word "check", as used in the tables, means to visually inspect and/or manually test for loose connections, burned components, mechanical binding, breaks or tears, looseness or tightness, etc.

When the tables say to "replace" a module, be sure to return the original module to the system if the replacement did not repair the problem. Do this before you replace another module. The tables are given in the following pages.

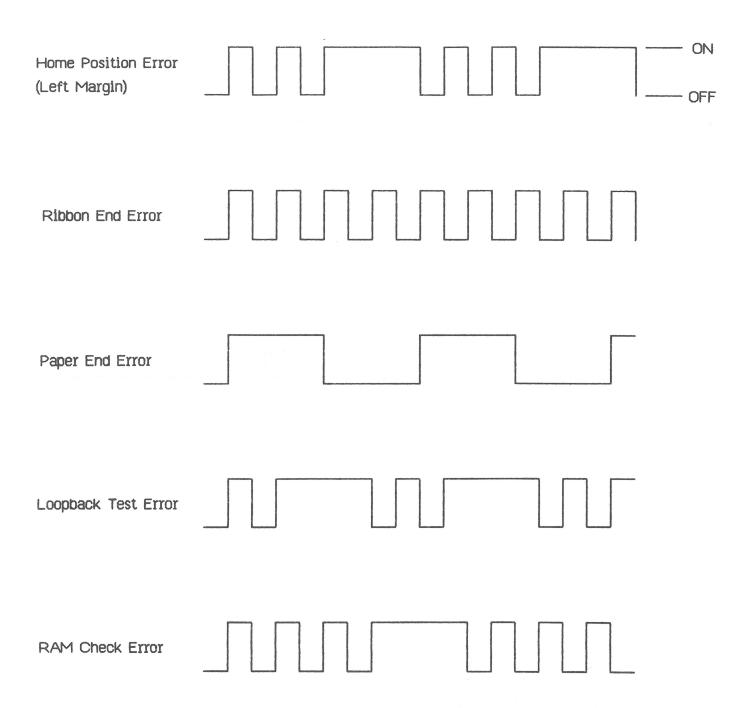


FIGURE 1

# SYMPTOM TABLES

## ERROR CONDITIONS

Certain error conditions are indicated by the SELECT lamp on the Scribe control panel blinking on and off in various patterns. Figure 1 indicates the different patterns and their meanings.

SYMPTOM	CORRECTIVE ACTION							
Select lamp flashes slowly (Paper End Error)	1.	paper is out, insert paper						
Slowly (raper bild bilot)	2.	paper is inserted too far to the right						
	3.	clean paper detect sensor						
	4.	replace logic board						
	5.	replace mechanism assembly due to a defective paper detect sensor						
Select lamp flashes rapidly (Ribbon End Error)		remove and reseat ribbon cassette						
	2.	replace ribbon cassette and press select switch						
	3.	replace mechanism assembly, due to a defective out of ribbon detect sensor						
	4.	replace logic board						
Select lamp flashes rapidly three times followed by a pause and then three more rapid flashes (Ram Check Error)	1.	replace logic board						

SYMPTOM		CORRECTIVE ACTION							
Select lamp flashes rapidly two times followed by a pause and then two more rapid	1.	check that nut on left drive belt pulley is not overtightened.							
flashes (Home Position Error)	2.	check carriage belt tension							
	3.	replace mechanism assembly							
Select lamp flashes once followed by a pause and then another flash	1.	check loopback connector is securely connected							
(Loopback Test Error)	2.	replace logic board							
Select lamp flashes very fast (no error	1.	replace ribbon							
condition); printer doesn't operate	2.	replace logic board							
Select lamp lit continuously, carriage does not move	1.	check baud rate setting of DIP switch							
222236	2.	replace interface cable							
	3.	replace logic board							

#### PRINT QUALITY PROBLEMS

SYMPTOM		CORRECTIVE ACTION
Print is light	1.	check that the type of paper being used is appropriate (refer to User's manual)
	2.	check DIP switch setting is appropriate for paper type being used (refer to User's Manual)
	3.	replace ribbon cassette with new one
	4.	check ribbon drive wire is connected and drive pulley is turning
	5.	check print head is clean
	6.	check print head gap
	7.	replace print head
	8.	replace ribbon drive wire
	9.	replace logic board
Print is dark	1.	check DIP switch setting is appropriate for paper type being used
	2.	replace print head
	3.	replace logic board
Print density varies	1.	replace ribbon cassette
while printing on any type of paper	2.	check ribbon feed mechanism, and replace mechanism assembly if defective
	3.	check ribbon drive wire

SYMPTOM		CORRECTIVE ACTION
Control panel keys do not operate properly	1.	check control panel cable connector (CN7) is securely connected to the logic board
	2.	replace control panel
	3.	replace logic board
Prints without paper	1.	clean paper detect sensor
	2.	replace mechanism assembly due to a defective paper detect sensor
	3.	replace logic board
Carriage strikes against end	1.	check that nut on left drive belt pulley is not overtightened.
	2.	check drive belt tension
	3.	check home position switch; replace mechanism assembly if defective
	4.	check connector (CN8) securely connected
	5.	replace logic board
Carriage moves to center and stops after power is turned on		install paper and/or ribbon cassette
curiod on	2.	replace logic board
Carriage moves to right when power is turned on, and then stops	1.	replace logic board
Print head "taps" platen once when power is turned on, and printer doesn't operate	1.	replace logic board
Scribe Printer Troubleshooti	ng	rev. Jan 86 page 4.14

SYMPTOM	CORRECTIVE ACTION	ON
Printer does not operate and print head taps the platen once when power is turned off	l. replace logic bo	pard
Print head engages into platen and stays, printer	l. replace logic bo	ard
does not operate further	check printhead replacement of l is made	
Carriage "jumps" once when power is turned on and then doesn't operate	l. replace logic bo	pard
Printer does not operate and platen roller reverse feeds when power is removed	l. replace logic bo	pard
Carriage jumps around then stops, when power is turned on	l. replace logic bo	pard

#### Scribe Printer Technical Procedures

#### Section 5

#### Preventive Maintenance

#### Contents:

Manufacturer's				
Recommended Cle	aning and L	ubricating M	aterials	5.3
Routine Cleanin	g and Lubri	cation After	Servicing	5.5
Yearly Maintena	nce			5.11

#### MANUFACTURER'S RECOMMENDED MAINTENANCE SCHEDULE

Use		e eve	ery year
		- As	Service required during preventive or crective maintenance
	Dealer Service Once every year or 500,000 lines of print		
x	x	х	Clean and lubricate carriage shaft
	х	х	Clean <b>platen</b>
	x	х	Check drive belt tension
	х	х	Clean print head
	х	х	Clean paper-out sensor
	х	x	Clean <b>front guide bar</b>
			Clean and lubricate:
	х	х	a) carriage bearing stud
	х	х	b) carriage drive motor idler gear stud
	х	х	c) paper feed motor idler gear studs
	х	х	d) drive belt pulley shafts
		х	Lubricate platen sleeve bearings
		х	Lubricate tractor sleeve bearings

#### RECOMMENDED CLEANING AND LUBRICATING MATERIALS

Cleaning: clean absorbent cloth or piece of gauze

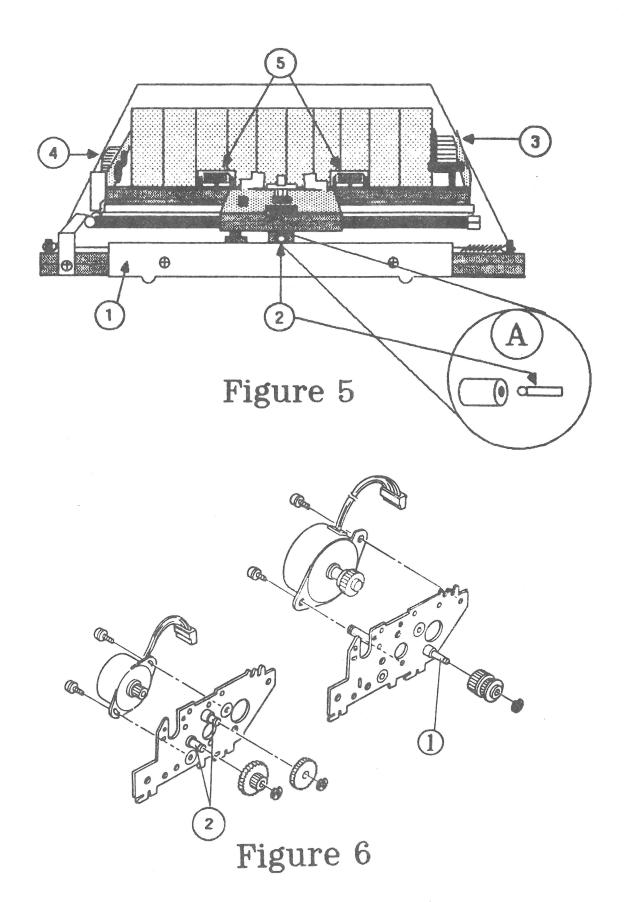
small soft brush cotton swabs

alcohol (isopropyl alcohol or equivalent)

Lubricating: Tellus oil #46 (Apple P/N 970-0006)

Scribe Printer Maintenance

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- 8. Remove the print head and clean it with a cotton swab moistened with alcohol. CAUTION: In reinstalling, be sure to reinstall the rubber cap over the connector.
- 9. Clean the front guide bar with a clean cloth moistened with alcohol. (See Figure 5, #1.)
- 10. Clean and lubricate the carriage bearing stud (Figure 5, #2 and detail A) as follows:
  - a) Pop the bearing off the stud with a small screwdriver.
  - b) Clean the stud; apply one drop of oil.
  - c) Replace the bearing on the stud.
- 11. Clean and lubricate the idler gear stud on the carriage drive motor (Figure 6, #1: for location see Figure 5, #3) as follows:
  - a) Loosen the drive belt (see Section 3, Adjusting the Drive Belt Tension) and slip it off the idler gear.
  - b) Remove the E-clip and pull the idler gear off the stud. NOTE: Pulling the gear off takes some effort.
  - c) Clean the stud; lubricate with one drop of oil.
  - d) Reinstall the gear and E-clip, making sure the outer lip is on the gear. (Do not reinstall the drive belt yet.)
- 12. Lubricate the idler gear studs on the paper feed motor (Figure 6, #2: for location see Figure 5, #4) as follows:

#### To access the idler gears:

- a) Move the carriage assembly all the way to the right.
- b) Remove the two feed rollers (Figure 5, #5) from the paper pan.
- c) Remove the two screws that hold the paper pan (one under each roller slot).
- d) Unplug the paper-out sensor cable from its connector on the logic board.
- e) Remove the paper pan from the printer assembly.

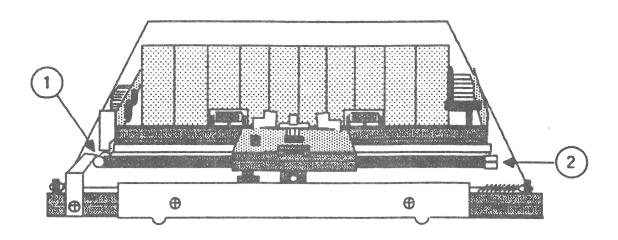
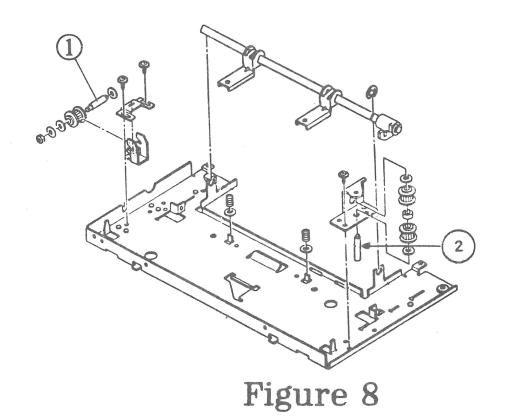


Figure 7



#### To lubricate:

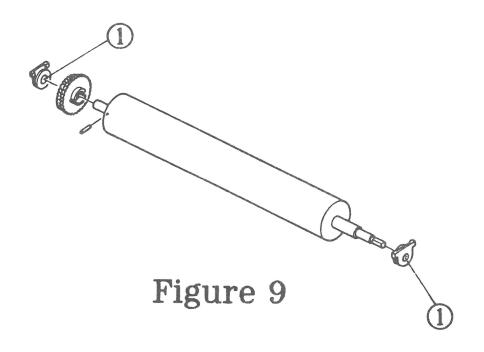
- a) Remove the E-clip and washer from the upper bearing and pull the bearing off its stud.
- b) Clean the stud; apply one drop of oil; wipe off any excess.
- c) Put a small drop of oil behind the bearing on the lower stud (without removing the bearing).
- d) Replace the upper bearing on its stud; replace the washer and E-clip.
- e) Put the paper pan back into place, making sure to route the sensor cable **under** the square rod above the logic board, and reconnect the cable.
- f) Replace the two screws in the paper pan, making sure the copper grounding clip is in place under the left-hand screw.
- g) Reinstall the two feed rollers. (The smaller cylinders go to the front.)

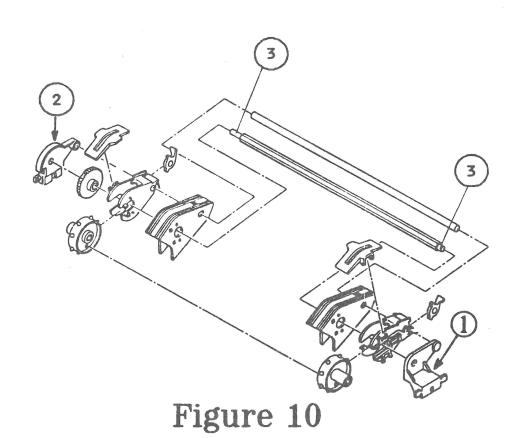
## 13. Clean and lubricate the left drive belt pulley shaft as follows:

- a) Remove the pulley assembly from its slot (see Figure 7, #1; exploded view in Figure 8, #1).
- b) Being careful not to lose any washers, slide the shaft from the pulley assembly.
- c) Clean the shaft; apply one drop of oil.
- d) Reassemble the pulley and reinsert it in its slot.

### 14. Clean and lubricate the right drive belt pulley shaft as follows:

- a) Remove the two screws at the base of the right drive pulley assembly (Figure 7, #2; exploded view in Figure 8, #2), and remove the assembly from the printer.
- b) With a small pointed object, push down on the top of the shaft. Then grasp the bottom of the shaft and pull it out of the assembly. CAUTION: Leave the pulleys in the assembly: if you remove them, they will be difficult to reassemble.





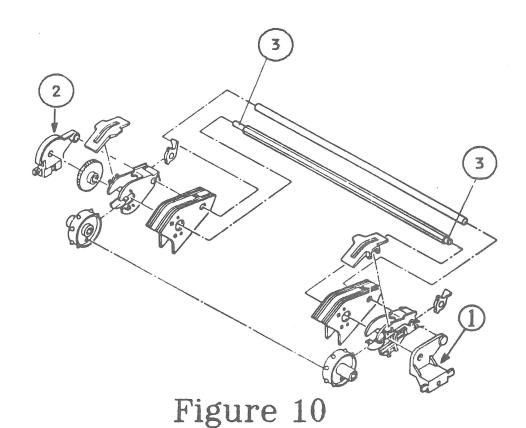
- c) Clean the shaft; then apply one drop of oil.
- d) Put the shaft back through the assembly (the small end goes on top), and replace the assembly in the printer.
- 15. Reposition the drive belt and adjust the drive belt tension (see Section 3, Adjustments).
- 16. Reinstall the platen assembly and tractor assembly (unless you are performing Yearly Maintenance: in that case, skip to Yearly Maintenance, below.)
- 17. Replace the ribbon cartridge.
- 18. Perform the Loopback Test to check printing performance. (See Section 1, Basics.)

#### YEARLY MAINTENANCE

Once every year or 500,000 lines of print, the following steps should be performed (in addition to the Routine Cleaning and Lubrication above).

- 1. Clean and lubricate the platen sleeve bearings as follows:
  - a) Remove the bearings from the platen assembly (see Figure 9, #1).
  - b) Clean the platen shaft and the bearings with a clean cloth moistened with alcohol.
  - c) Apply one drop of lubricating oil to each end of the platen shaft. Wipe off the excess.
  - d) Reinstall the bearings.
- 2. Clean and lubricate the tractor sleeve bearings as follows:
  - a) Pull the right side panel off the tractor assembly (see Figure 10, #1).
  - b) Pull the left side panel off the end of the tractor sleeve (Figure 10, #2). (You do not have to remove the panel completely: just expose the end of the tractor sleeve.)

- c) Clean the ends of the tractor shaft (Figure 10, #3) with a clean cloth.
- Put one drop of lubricating oil on each end.
- Reinstall the side panels. e )
- Reassemble the printer and perform the loopback test to check operation and print quality.



#### Scribe Printer Technical Procedures

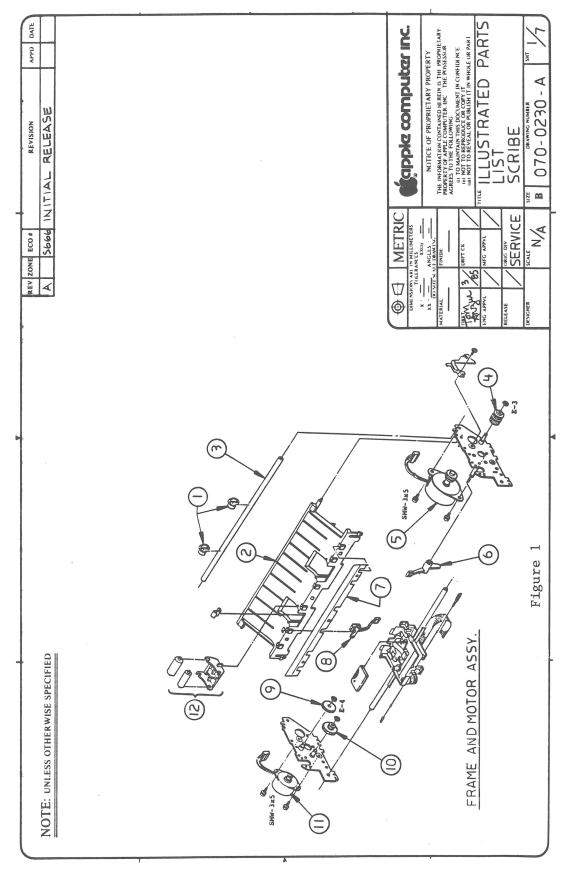
#### Section 6

#### Illustrated Parts List

The figures and lists below include all piece parts that can be purchased separately from Apple for the Scribe Printer, along with their part numbers. These are the only parts available from Apple. Refer to your Apple Service Programs manual for prices.

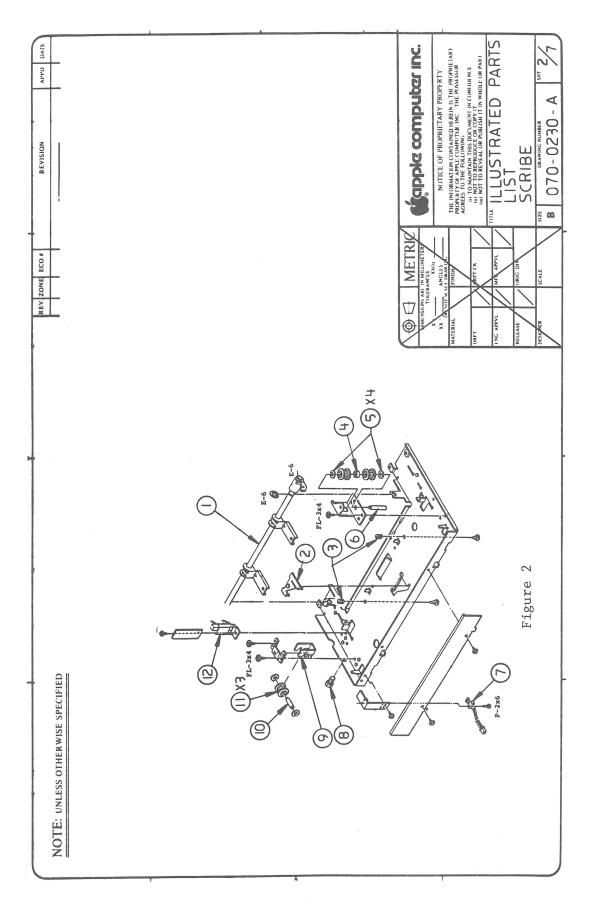
#### Contents:

Frame and Motor Assembly6.1
Base Assembly6.3
Tractor & Platen Assembly6.5
Carriage Assembly6.7
Covers6.9
Power Supply & Main Logic Board6.11
Cables6.13



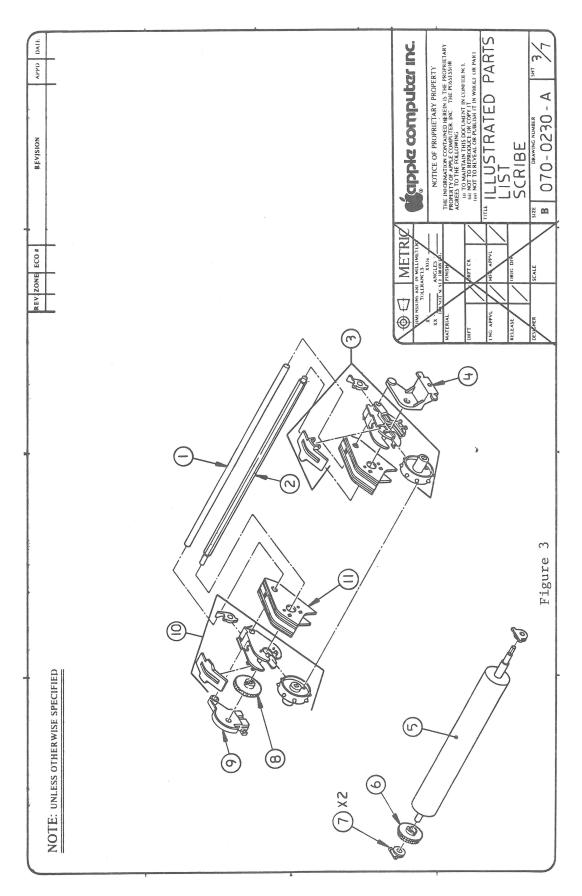
#### SCRIBE PRINTER, FRAME & MOTOR ASSEMBLY (Figure 1)

Item	Part No.	Description
1	970-0943	Clip, Wire Harness
2	970-0949	Pan, Paper Feed
3	970-0911	Shaft, Frame Support
4	970-0935	Pulley, Carriage Drive
5	970-0962	Motor, Carriage Drive
6	970-0929	Lever, Feed Roller Release
7	970-0916	Plate, Paper Deflector
8	970-0971	Sensor Assembly, Out of Paper Detect
9	970-0927	Gear, Idler
10	970-0925	Gear, Idler/Platen Drive
11	970-0963	Motor, Paper Feed
12	970-0956	Feed Roller Assembly



#### SCRIBE PRINTER, BASE ASSEMBLY (Figure 2)

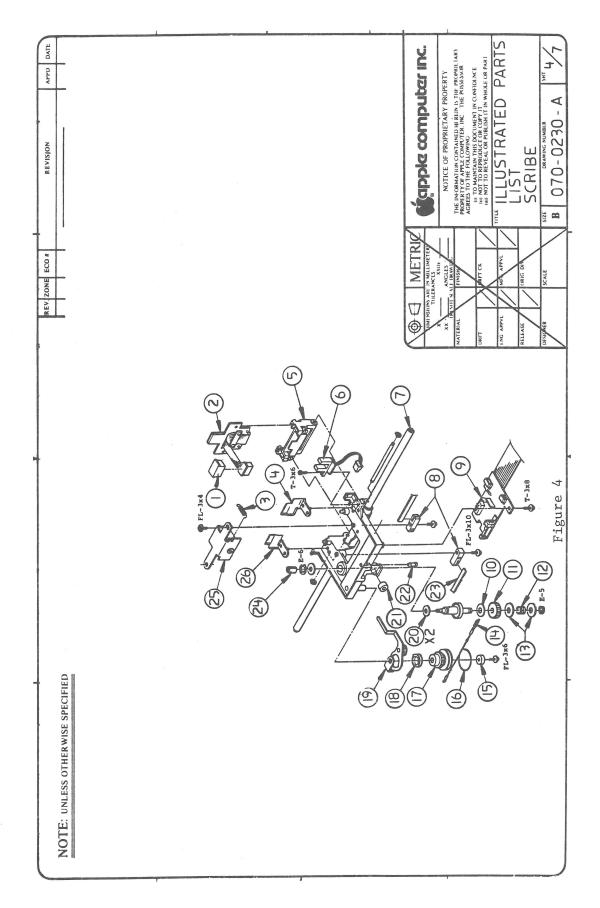
Item	Part No.	Description
1	970-0969	Shaft Assembly, Feed Roller Release
2	970-0944	Retainer, Ribbon Cable
3	970-0899	Spring, Feed Roller
4	970-0928	Collar, Carriage Drive Pulley
5	970-0903	Washer, Carriage Drive Pulley
6	970-0907	Shaft, Pulley Mounting
7	970-0966	Switch, Home Position
8	423-2001	Screw, Hex Hd, $3.0 \times .50 \times 12$
9	970-0915	Plate, Carriage Drive Pulley Mounting
10	970-0908	Shaft, Carriage Drive Pulley
11	970-0936	Pulley, Carriage Drive, Inverter
12	970-0961	Resistor Assembly, 5 Watt Ceramic



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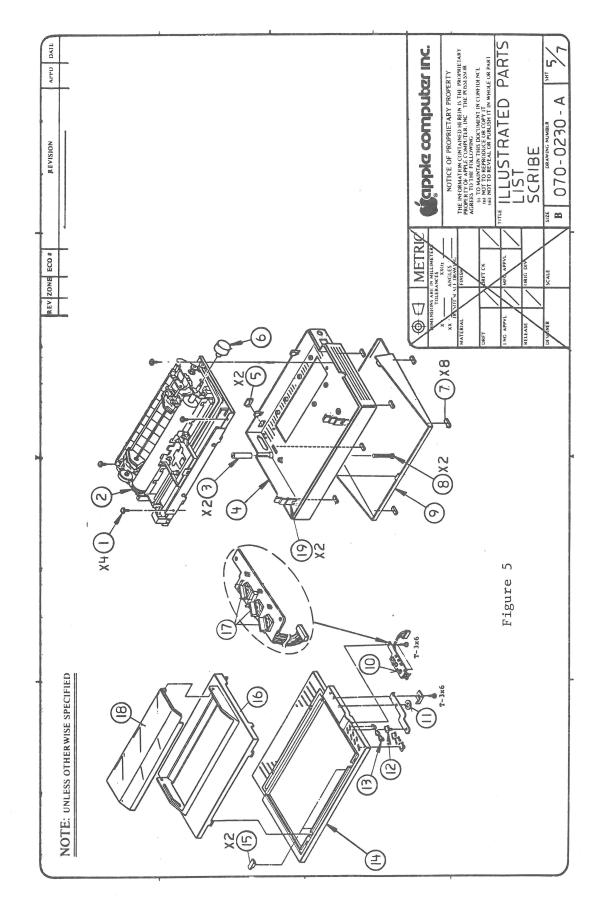
#### SCRIBE PRINTER, TRACTOR & PLATEN ASSEMBLY (Figure 3)

Item	Part No.	Description
1	970-0910	Shaft, Tractor Support
2	970-0913	Shaft, Tractor Assembly Drive
3	970-0960	Tractor Assembly, R.H.
4	970-0924	Frame, R.H. Tractor Assy
5	970-0906	Platen Roller, Rubber
6	970-0926	Gear, Platen Drive
7	970-0930	Bearing, Platen Holder
8	970-0980	Gear, Tractor Drive
9	970-0923	Frame, L.H. Tractor Assembly
10	970-0959	Tractor Assembly, L.H.
11	970-0947	Guide, Paper/Tractor



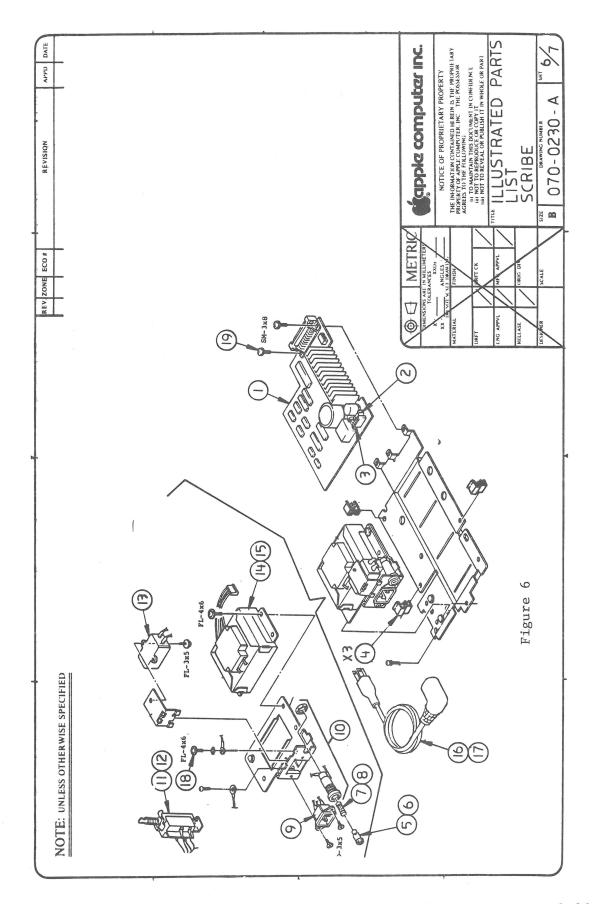
#### SCRIBE PRINTER, CARRIAGE ASSEMBLY (Figure 4)

Item	Part No.	Description
	970-0975	Carriage Assembly, Complete, w/o Printhead
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24	970-0955 076-0090 970-0972 970-0922 970-0965 970-0909 970-0918 970-0970 970-0945 970-0919 970-0914 076-0097 970-0912 076-0096 970-0912 076-0096 970-0958 970-0937 970-0937 970-0938	Cap, Print Head, Rubber Print Head Assembly Spring, Solenoid Assembly Guide, Paper Holder, R.H. Mounting Assembly, Print Head Sensor Assembly, Out of Ribbon Detect Shaft Carriage Clamp, Carriage Drive Belt PCB, Carriage Assembly w/Cable Washer, Ribbon Feed Friction Gear, Ribbon Take-up Spring, Ribbon, Clutch/Take-up Washer, Ribbon Take-up Spring Assembly, Ribbon Cable Collar, Ribbon Clutch Cable Assembly, Ribbon Feed Gear, Ribbon Clutch Drive Gear, Metal Ribbon Clutch Feed Gear Assembly, Ribbon Feed Correction Washer, Ribbon Feed Bearing, Carriage Assembly Actuator, Ribbon Box Detect Belt Assembly, Carriage Drive Capstain, Ribbon Drive
25 26	970-0936 970-0964 970-0939	Solenoid Assembly, Print Head Guide, Paper Holder, L.H.



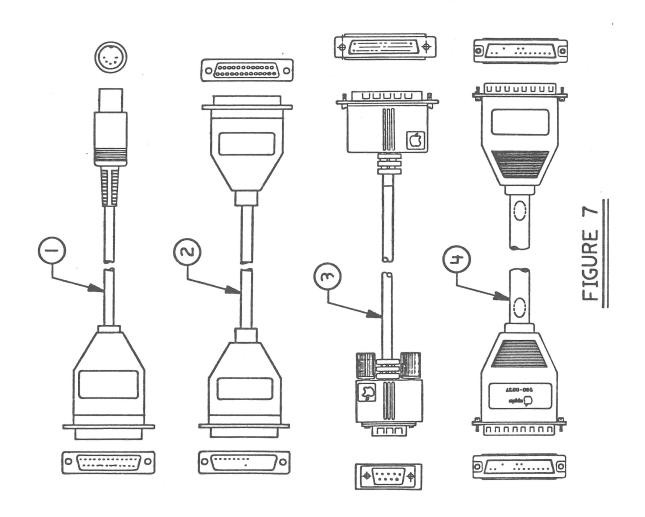
#### SCRIBE PRINTER, COVERS (Figure 5)

Item	Part No.	Description
1	076-0089	Screw Assembly, Misc.
2	661-75218	Mechanism Assembly w/o Printhead
3	970-0978	Spacer, Cover
4	970-0973	Cover Assembly, Bottom
5	970-0948	Plug, DIP Switch
6	970-0934	Knob, Platen
7	076-0094	Feet Assembly, Rubber
8	076-0089	Screw Assembly, Misc
9	970-0967	Tray Assembly, Paper
10	076-0093	Control Panel Assembly
11	970-0904	Nut, Push
12	970-0933	Button, Power Switch
13	970-0932	Lens, Control Panel, LED
14	970-0968	Cover Assembly, Top
15	970-0946	Plug, Top Cover, Snap
16	970-0951	Cover, Printer
17	970-0931	Button, Control Panel
18	970-0952	Lid, Printer Cover
19	970-0974	Clip, Bottom/Top Cover



SCRIBE PRINTER - POWER SUPPLY & MAIN LOGIC BOARD (FIGURE 6)

Item	Part No.	Description
	661-75217	Main Logic PCB
	740-0400	Fuse, Medium Time Lag, 2A, 125V
	740-0401	Fuse, Medium Time Lag, 4A, 125V
4 5	970-0942	Clip, PCB Guide
5	970-0712	Cap, Fuse, 110V
6	970-0713	Cap, Fuse, 220V
7	740-0101	Fuse, 2A, 250V
-	740-0100	Fuse, 1A, 250V
9	970-0983	Receptacle, AC Input
10	970-0902	Holder, AC Fuse
11	076-0091	Power Switch Assembly, 110V
12	076-0092	Power Switch Assembly, 220V
13	970-0901	Noise Filter, AC Line
14	970-0953	Transformer, AC Line, 115V
15	970-0954	Transformer, AC Line, 220V
16	970-0635	Power Cord, 110V
17	970-0710	Power Cord, 220V
18	076-0089	Screw Assembly, Misc.
19	076-0089	Screw Assembly, Misc.



#### SCRIBE PRINTER - CABLES (Figure 7)

Item	Part No.	Description
1 2	590-0191 590-0166	Cable, Printer Interface AIIc Modem Eliminator Cable Assembly
3	590-0169	Macintosh Printer Cable
4	590-0037	Serial Interface Cable

### **★** Apple Technical Procedures

# **Apple Color Plotter**

### **Technical Procedures**

#### TABLE OF CONTENTS

d TABLE OF CONTENTS				
Section 1 – Troubleshooting	1.3 1.4 1.6 1.7 1.8	Interface Flowchart		
Section 2 – Setup and Configuration	2.2 2.2 2.3 2.5 2.5 2.6			
Section 3— Take-Apart	3.3 3.3 3.5 3.7 3.7 3.9 3.11 3.13 3.15 3.17 3.19 3.23 3.31 3.33 3.35 3.35	Cover Carriage/Bed Assembly Main PC Board Keyboard Assembly On/Off Swithc Transformer Paper Feed Roller Motor Left Pully Assembly Pulley Motor Carriage Wire Solenoid		
Section 4– Illustrated	4.2	Color Plotter Assembly		

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			be reproduced in any	, form

### **★** Apple Technical Procedures

# **Apple Color Plotter**

## Section 1 - Troubleshooting

#### **CONTENTS**

1.3	Introduction
1.3	Materials Required
1.4	Troubleshooting Flowchar
1.6	Interface Test Flowchart
1.7	Alignment Procedure
1.8	Plotter Test Example
19	Plotter Self-Test

#### □ INTRODUCTION

The troubleshooting flowchart is largely self explanatory. Refer to the take-apart section of these procedures if you need instruction on how to remove, replace, and adjust modules.

A few terms that are used in the flowchart may need clarification.

**Plotter Initialization** - After powering-up the plotter, the pen carriage travels to the left and rotates several times until pen number 1 is pointing down.

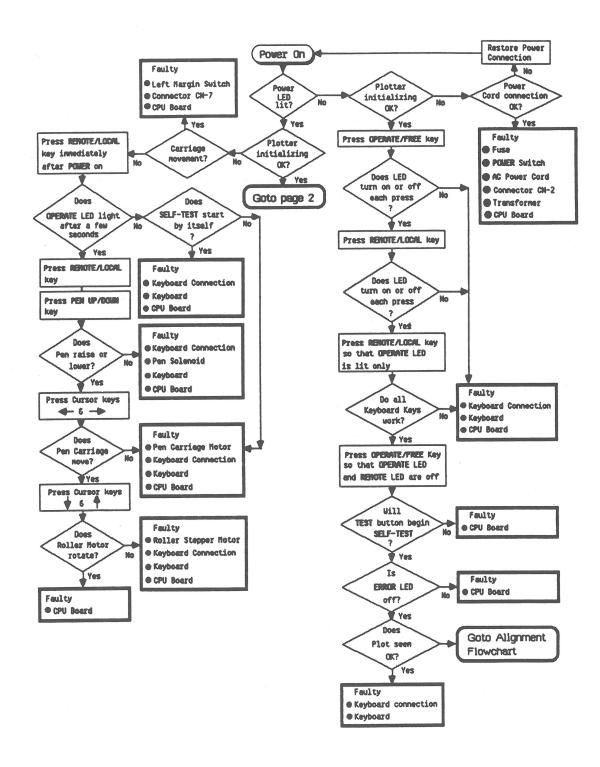
**Self-Test** - After power-up and initialization, press the test button on the plotter keyboard. The plotter is reinitialized, and then draws a self-test pattern.

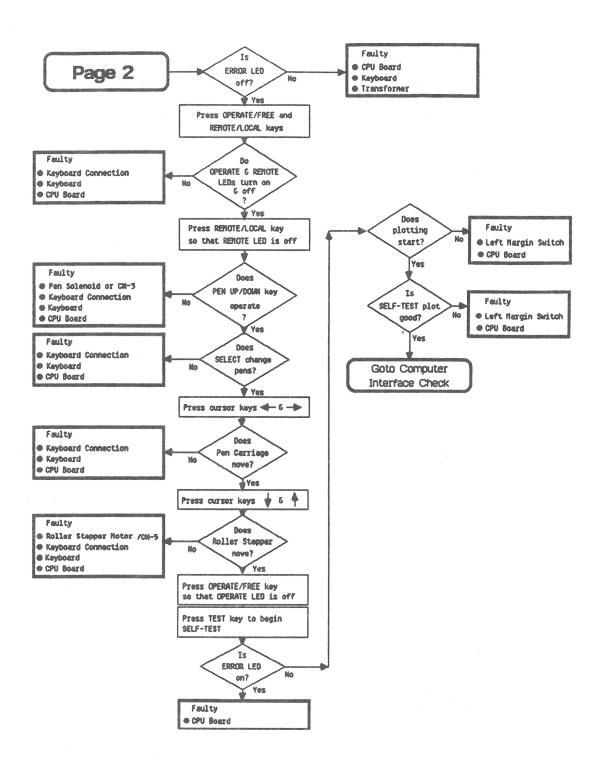
Names of parts and their location can be found in the Exploded Diagram and Parts List (Section 4, of these procedures).

#### **Materials Required**

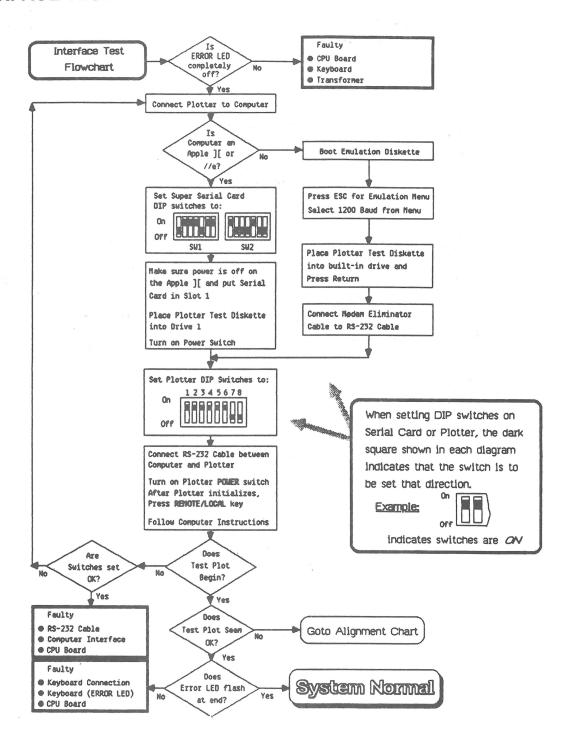
Plotter test diskette
Medium phillips screwdriver
Medium flatblade screwdriver
Allen wrench
5.5 mm nutdriver
Tape

#### ☐ TROUBLESHOOTING FLOWCHART

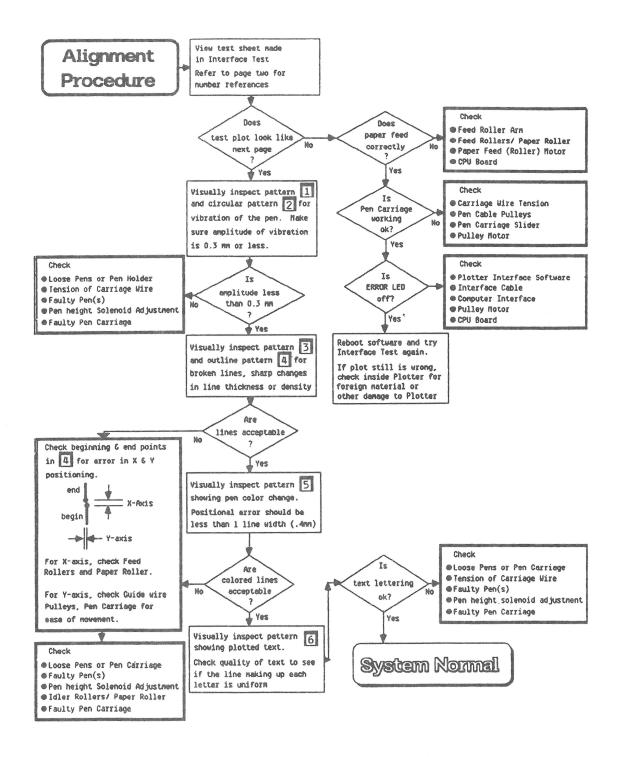




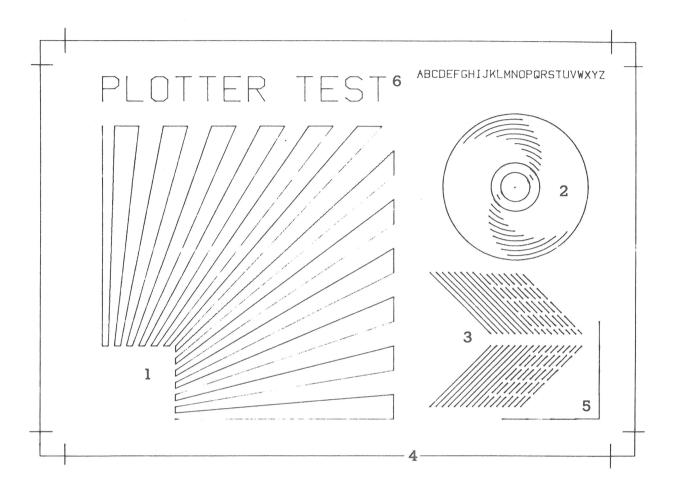
#### □ INTERFACE TEST FLOWCHART



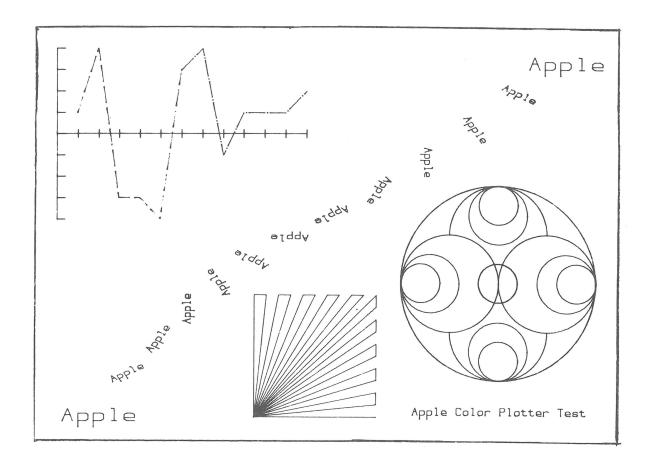
#### □ ALIGNMENT PROCEDURE



### □ PLOTTER TEST EXAMPLE



## □ PLOTTER SELF-TEST



#### □ INTRODUCTION

Refer to Section 4, Exploded Diagram and Parts List, if you need assistance locating the parts referred to in this section.

There are a few things you must remember to do when you are setting up the plotter for a customer.

#### **Materials Required**

Apple Color Plotter

Apple computer with monitor and power cable

- If you are attaching an Apple IIe, II+, or II you will need a serial port card
- If you are attaching an Apple III you will need an Apple II Emulation diskette

Apple Color Plotter test diskette

Plotter power cable

RS232 cable

Modem eliminator cable Small flatblade screwdriver

## Things to Remember

- 1. Use the modem eliminator cable as well as the RS232 cable to connect the plotter to an Apple.
- 2. Verify the setting of the plotter DIP switches. (Although the User's Guide says the plotter will be shipped with the switches set correctly, it is possible that they will not be correct.).
- 3. Boot the plotter test diskette to see that the computer communicates successfully with the plotter.

Below you will find brief instructions outlining these procedures.

**WARNING:** The Apple III and the Apple II computers have slightly different procedures. Be sure to read the notes (in each section below) which describe these differences.

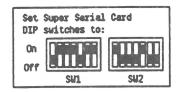
#### ☐ HOOKING UP THE PLOTTER

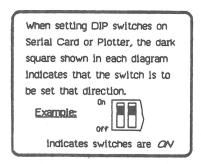
#### **Procedure**

- 1. Connect the "female" end of the modem eliminator cable (the shorter of the two cables you received with the color plotter) to one of the ends of the RS232 cable.
- 2. Tighten the screws that come with the cables to secure the connection.
- 3. Connect one end (it does not matter which) of the cable you just "made" to the plotter. Secure the connection by tightening the mounting screws.
- 4. Connect the other end of the cable to the computer.

Note: Apple III - Attach it to port C.

**Note:** Apple II, II+, IIe - Attach it to a super-serial card with DIP switches set as seen below (See Figure 1).





#### FIGURE 1

- 4. Connect the power cable to the plotter.
- 5. Plug the power cable into an AC outlet.

#### □ SETTING THE DIP SWITCHES

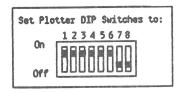
The plotter is capable of communicating with a large number of computers. Within the RS232 standard there are variations of signal format and transmission speed, to suit different machine-to-machine communication requirements. The interface setting switches allow you to define the RS232 input.

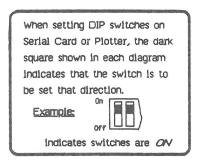
The interface setting switches are on the back panel of the plotter.

Apple Computers communicate with the plotter via an RS232 interface that is configured as follows:

- 7 bits
- No parity selected
- 2 stop bits
- 1200 baud

Generally the settings for the plotter, when communicating with an Apple, should be as shown in Figure 2.

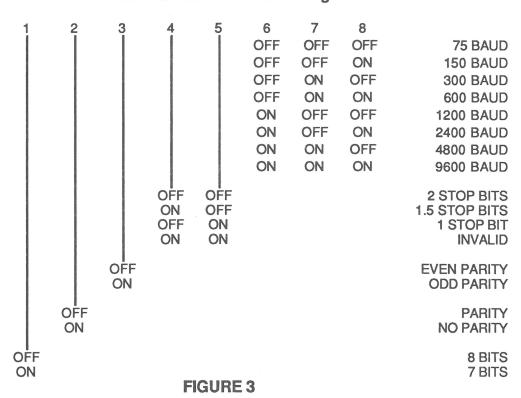




#### FIGURE 2

For computers which do not follow this particular RS232 interface requirement, look at the table. (See Figure 3.)

#### **Plotter Interface DIP Switch Settings**



#### **LOAD PENS**

**Note:** If these instructions are not sufficient, a more detailed explanation can be found in the "Pens and Paper" chapter in the User's Guide.

#### **Procedure**

- 1. Remove the pen holder from the pen carriage by pulling it towards you by the light colored plastic.
- 2. The pen holder has the numbers 1 through 4 on the front. Load the holder with the following pen/number combinations: black/1; red/2; green/3; blue/4.
- 3. Install the holder in the pen carriage. (Slide the pen holder onto the hub of the (black) carriage head until it snaps into place.)

**Note:** The holder will only fit one way.

#### **LOAD PAPER**

**Note:** If these instructions are not sufficient, more detailed explanations can be found in the "Pens and Paper" chapter in the User's Guide.

#### Set Paper Width

- 1. Push pen carriage to the left.
- 2. Pull the light colored arm of the right feed roller horizontally toward you and slide the feed roller mechanism sideways to the right as far as it will go.
- 3. Slide a piece of 8 1/2 by 11 inch paper lengthwise on the front deck of the plotter in the position to be fed in, with its left edge about 6 mm (1/4") from the left wall of the plotter.
- 4. Pull the light colored arm of the right feed roller horizontally toward you and slide the feed roller mechanism sideways to the left until it is well over the right edge of the paper. The paper should not run into the arm itself.
- 5. Release the arm, then move the arm and feed roller to the right a short distance until it clicks into a notch.

**Note:** The feed roller will not drop down enough to grip the paper until it clicks into a notch.

#### Insert Paper

- 6. Slide a sheet of paper under the metal tabs until it will go no further. Make the paper align with the line at the left of the paper table, marked "paper side."
- 7. Depress the paper feed knob on the right of the plotter, and turn it clockwise. You may have to push the paper a bit before it catches.

Paper is properly inserted when the top edge reaches the marks half way up the paper table.

If the paper is not properly aligned (straight), remove it and try again.

## ☐ TESTING COMPUTER/PLOTTER COMMUNICATION

#### **Apple III**

- 1. Turn on the plotter.
- 2. Press LOCAL on the plotter keyboard.
- 3. Boot the Apple II Emulation diskette.
- 4. Insert plotter test diskette.
- 5. Press <RETURN>. (Continue at Testing the Plotter)

### Apple II, II+, and Ile

- Boot the plotter test diskette in disk drive 1.

#### **Testing the Plotter**

Follow the instructions on the screen.

- 1. Load the paper into the plotter. (The "size A" on the screen refers to an "A" on the plotter table, which indicates the width of the paper.)
- 2. Press <RETURN>.

The plotter should now draw a test pattern. See Figure 4, on the following page, for an example.

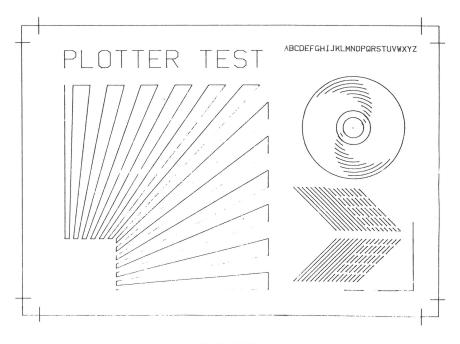


FIGURE 4

## **★** Apple Technical Procedures

# **Apple Color Plotter**

## Section 3 - Take-Apart

## □ CONTENTS

5.5	Introduction
3.4	Cover
3.6	Carriage/Bed Assembly
3.7	Main PC Board
3.9	Keyboard Assembly
3.11	On-Off Switch
3.12	Transformer
3.14	Paper Feed (Roller) Motor
3.17	Left Pulley Assembly
3.18	Pulley Motor
3.23	Carriage Wire
3.28	Adjust Carriage Wire Tension
3.30	Solenoid
3.30	Adjustment Procedure
3.32	Home Position Switch
3.33	Pen Carriage Assembly
3.35	Fuse
3.36	Bail Spring

#### □ INTRODUCTION

These procedures are constructed so you can find the replacement or adjustment you are interested in by using the table of contents as a reference guide.

Since there is no formal training on this product, go through this entire procedure if you have not done so previously. It is probably not necessary for you to practice the soldering in the removal and replacement of the ON-OFF switch. Be sure to:

- Follow the removal procedures in the order in which they are presented. Then reassemble the plotter, in the reverse order.
- Perform the adjustments when they are referred to in the replacement sections (i.e., do the solenoid adjustment as part of replacing the solenoid, and do the carriage wire adjustment when replacing the pulley motor).
- Perform the carriage wire replacement. The first time it can be very tricky!
- Remove and replace both motors.

## Things to Remember

- 1. Unless otherwise noted, any direction designations assume the plotter is facing you in the usual operating position.
- 2. The adjustments are approximate. It is not necessary to measure the gaps using feeler gauges or calipers.
- 3. In all cases, when replacing parts or making any of the adjustments, first turn off and unplug the plotter.

#### **Materials Required**

Medium phillips screwdriver Medium flat blade screwdriver 1.5 mm allen wrench 5.5 mm nutdriver Needlenose pliers Tape

#### □ CARRIAGE/BED ASSEMBLY

#### Remove

- 1. Remove cover.
- 2. Remove the four phillips head screws, two from either side of the carriage/bed assembly.
- 3. Disconnect the four cables (all except the transformer cable) from the main PC board and from the two routing clamps which hold the cables to the base. (To release the cables push down on the outside of the clamp and pull up on the body.) You may have to lift the carriage/bed assembly to access two of the connectors.
- 4. Remove the carriage/bed.

#### Replace

- 1. Set the carriage/bed assembly on the base.
- 2. Connect the cables to the PC board. (The two motor cables are connected to the PC board under the carriage/bed assembly. The rear motor is connected at CN4. The front motor is connected at CN5. The solenoid cable is fed under the carriage/bed assembly to CN3. The home position switch is connected at CN7.) Put the cables in the two clamps which hold the cables to the base.
- 3. Replace the four screws.
- 4. Replace the cover.

## ☐ MAIN PC BOARD

#### Remove

- 1. Remove the cover.
- 2. Remove the carriage/bed assembly (Figure 2, #1).
- 3. Disconnect the transformer connector.

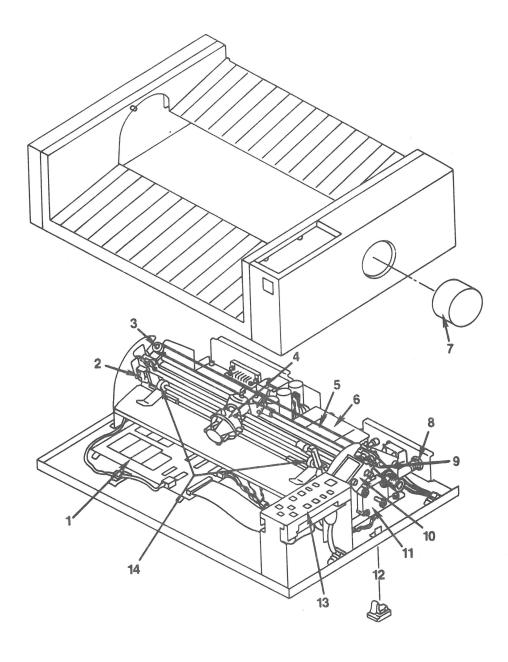


FIGURE 2

4. Disconnect the keyboard connector.

CAUTION: The ribbon cable is attached by a strip connector. To remove the cable, grasp it as close to the connector as possible and pull to the right as you gently wriggle it out.

5. The PC board is attached to the base by four standoffs and by two screws which are threaded through a bracket mounted to the back of the PC board.

Remove the phillips screws on the far right and left sides of the PC board bracket. Push in the standoffs and carefully lift the board from the base.

#### Replace

- 1. Place the PC board on the base and push down to engage the stand-offs.
- 2. Replace the screws.
- 3. Connect the transformer and keyboard connector.
- 4. Replace the carriage/bed assembly.
- 5. Replace the cover.

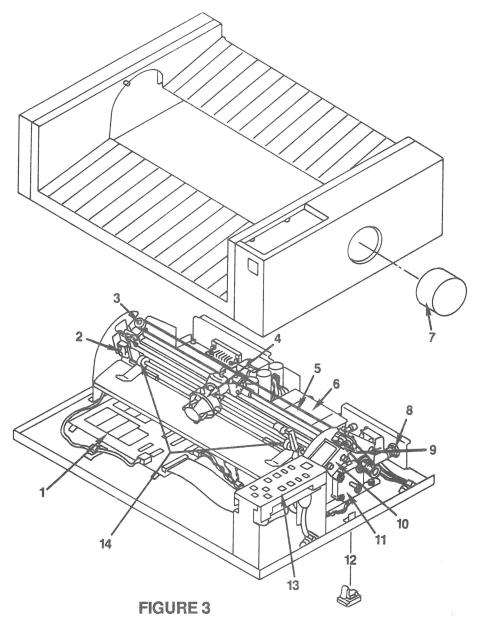
### □ KEYBOARD ASSEMBLY

#### Remove

- 1. Remove the cover.
- 2. Disconnect the ribbon cable from the main PC board.

CAUTION: The ribbon cable is attached by a strip connector. To remove the cable, grasp it as close to the connector as possible and gently wriggle it out.

3. Remove the two phillips head screws which attach the keyboard assembly (Figure 3, #13) to the base.



- 4. Remove the ON/OFF switch wires from the routing clamps on the base.
- 5. Remove the ON/OFF switch from the keyboard assembly by removing the phillips head screw and lock washer.

#### Replace

- 1. Place the ON/OFF switch in the new keyboard assembly. Screw in phillips head screw and lock washer to hold it in place.
- 2. Place the keyboard assembly on the bottom plate. Put the leads from the ON/OFF switch in the routing clamps. Tighten down the two sets of phillips head screws and lock washers.
- 3. Connect the ribbon cable to the main PC board.
- 4. Replace the cover.

#### □ ON/OFF SWITCH

The ON/OFF switch is located on the keyboard assembly.

#### Remove

- 1. Remove the cover.
- 2. Disconnect the ON/OFF switch from keyboard by removing the phillips screw and lock washer from the back of the keyboard.
- 3. Carefully cut off the shrink tubing with an X-acto knife.
- 4. Use a soldering iron to remove the cables from the terminals.

#### Replace

1. Slide an approximately 4 cm (1 1/2 inch) piece of approximately 1.8 cm (3/4 inch) diameter shrink tubing over the leads.

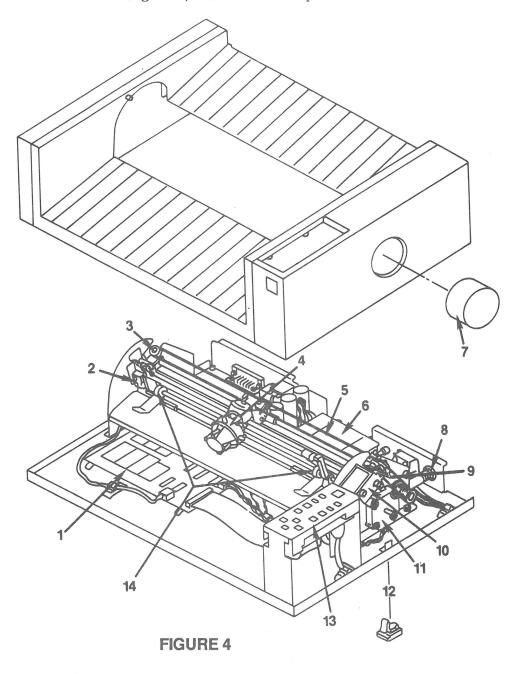
**WARNING:** You must replace the shrink tubing to avoid the possibility of electric shock.

- 2. Solder the leads to the switch. With the switch in the installed orientation, like-colored leads should be on the same side. The thicker leads should be attached to the center terminals. The thinner leads should be attached to the bottom terminals.
- 3. Slide the shrink tubing up over the terminals and heat it until snug.
- 4. Attach the ON/OFF switch to the keyboard assembly with the phillips head screw and lock washer.
- 5. Push switch in and out to be sure it works and is installed properly.
- 6. Replace the cover.

## ☐ TRANSFORMER

#### Remove

- 1. Remove the cover.
- 2. Remove the carriage/bed assembly.
- 3. Disconnect the transformer connector from the main PC board.
- 4. Remove the four screws that attach the transformer (Figure 4, #6) to the base plate.



- 5. Cut the cable-tie at the AC power socket.
- 6. Release the wires from the routing clamps.
- 7. Remove the ON/OFF switch from the keyboard assembly.
- 8. Desolder all the leads from the ON/OFF switch.

**Note:** This will allow you to install new shrink tubing.

#### Replace

1. Slide an approximately 4 cm (1 1/2 inch) piece of approximately 1.8 cm (3/4 inch) diameter shrink tubing over the ON/OFF switch leads.

**WARNING:** You must replace the shrink tubing to prevent the possibility of electric shock.

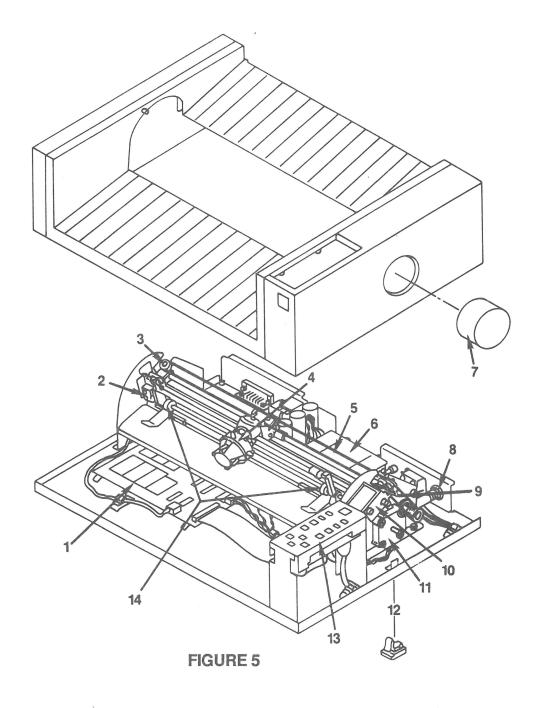
- 2. Solder the leads to the switch. With the switch in the correct orientation, like-colored leads should be on the same side. The thicker leads should be attached to the center terminals. The thinner leads should be attached to the bottom terminals.
- 3. Slide the shrink tubing up and apply heat to shrink it.
- 4. Replace the ON/OFF switch.
- 5. Wind the leads from the ON/OFF switch through the routing clamps back toward the transformer. Lock the clamps.
- 6. Screw down the transformer.
- 7. Connect the transformer connector to the main PC board.
- 8. Gather the AC power wires and the transformer power wires into a cable-tie.
- 9. Replace the carriage/bed assembly.
- 10. Replace the cover.

## □ PAPER FEED (ROLLER) MOTOR

This motor is the front motor on the right end of the carriage/bed assembly (Figure 5, #11).

#### Remove

- 1. Remove the cover.
- 2. Remove the carriage/bed assembly from the base.



- 3. Remove the nuts from the motor using a 5.5 mm nutdriver.
- 4. Pull the motor out. (The roller will come with it.)
- 5. Use an allen wrench to loosen the set screws that attach the motor to the roller. Pull the roller and motor apart.

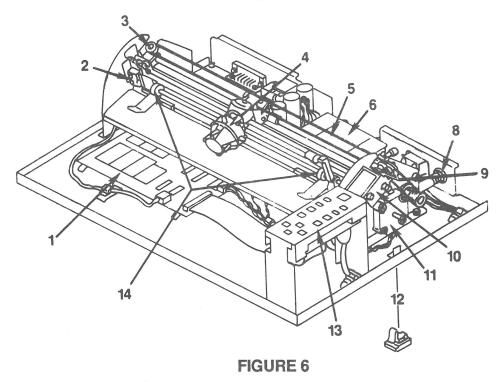
**Note:** You may have to use a large flatblade screwdriver to separate them.

#### Replace

- 1. Place the new motor on the roller with a gap of approximately 1.5 mm (1/16 inch) between the roller and motor. Tighten the set screws.
- 2. Orient the motor so the wires exit downward.
- 3. Slide the roller and motor back into place. (The motor should fit snugly to the frame.) If you are having trouble, try the following:
  - Line up the motor mounting screws with the carriage bed assembly.

... Continued on next page

• Depress the right feed roller arm and/or the left feed roller tab (Figure 6, #14) to give the roller more room to move.



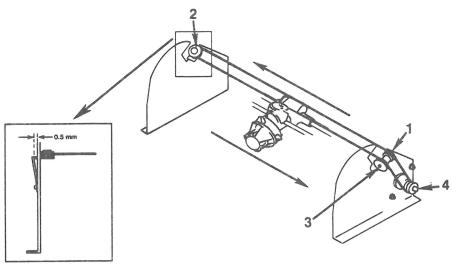
- Poke a small screwdriver through the hole in the left outside of the carriage/bed assembly to maneuver the end of the roller into place.
- 4. Replace the nuts, tightening alternately (the star washer goes with the top nut).
- 5. Replace the carriage/bed assembly.
- 6. Replace the cover.

### **LEFT PULLEY ASSEMBLY**

The left pulley assembly attaches the left pulley to the carriage/bed assembly (see Figure 6, #3).

# Remove and Replace

1. Put a piece of tape on the motor pulley (Figure 7, #4) so that the carriage wire will not unwind.



#### FIGURE 7

2. Remove and replace the left pulley assembly by removing and replacing the mounting screw on the bracket.

**Note:** When in place, the pulley should be inside the frame of the carriage assembly. (See Figure 7, insert.)

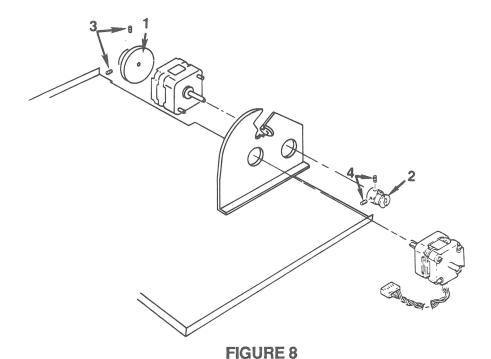
3. Remove the tape from the motor pulley.

## □ PULLEY MOTOR

#### Remove

This motor is the rear motor on the right end of the carriage/bed assembly.

1. To remove the flywheel (Figure 8, #1), rotate the motor pulley (Figure 8, #2) and flywheel so that the hole in the flywheel lines up with the set screws (Figure 8, #3) in the shaft. Loosen the two set screws.



- 2. Slide the flywheel off.
- 3. Slide the pen carriage (Figure 9, #4) to the middle of the carriage/bed assembly.

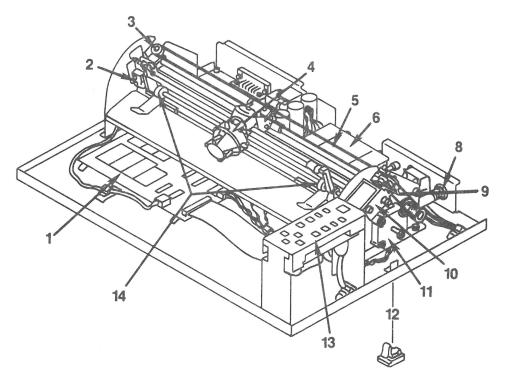


FIGURE 9

4. Loosen the retaining clamp screw (the easily visible phillips head screw on top of the pen carriage assembly that holds the carriage wire).

5. Loosen the two set screws (Figure 10, #4) on the motor pulley.

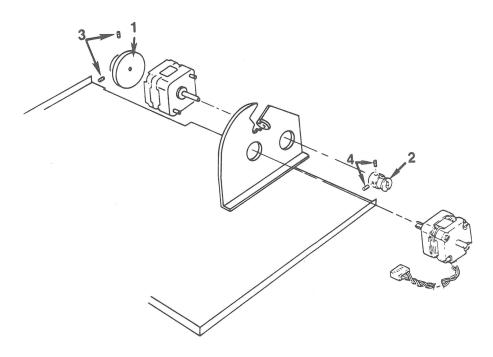


FIGURE 10

- 6. To ensure the carriage wire does not unwrap during the following steps, put some tape around the wrapped wires on the motor pulley.
- 7. Release the carriage wire tension by loosening the nuts on the pulley motor.

8. To further release the carriage wire tension, loosen but do not remove the mounting screw for the left pulley assembly. (Figure 11, #3.)

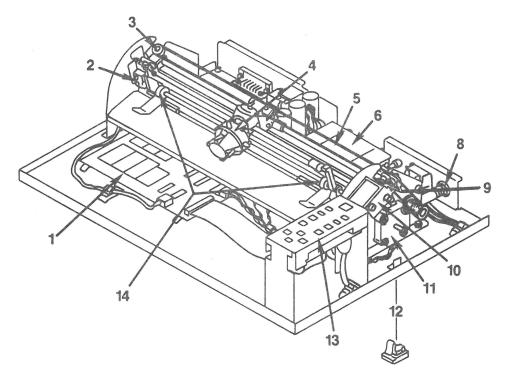


FIGURE 11

- 9. Slide the wire off the left pulley assembly. Gently but firmly pull the pulley away from the pulley motor. (You may have to use a flatblade screwdriver to pry it loose.)
- 10. Remove the nuts from the screws that hold the motor in place.
- 11. Remove the motor.

#### Replace

- 1. Put the motor into place (wires exiting downward).
- 2. Loosely replace the nuts for the motor (star washer belongs with top nut).
- 3. Slide the pulley back onto the motor. There should be an approximately 1.5 mm (1/16 inch) gap between the pulley and the side of the carriage/bed assembly.
- 4. Slide the carriage wire back over the left pulley. Ensure that the carriage wire is correctly mounted on the guide pulleys.
- 5. Remove the tape from the motor pulley and tighten down the set screws.
- 6. Tighten the left pulley-assembly mounting screw.

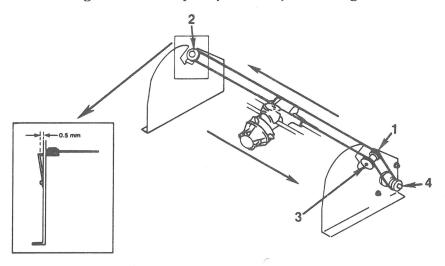


FIGURE 12

- 7. Turn the motor pulley until it has an equal number of turns on either side of where the carriage wire leaves the motor pulley.
- 8. Ensure that the pen carriage is in the middle of the carriage/bed assembly.
- 9. Place the carriage wire under the retaining clamp on the pen carriage. Tighten the retaining clamp screw.

- 10. Adjust the wire tension (see Carriage Wire Adjustment section) and tighten down motor pulley nuts.
- 11. Replace the flywheel. There should be an approximately 3 mm (1/8 inch) gap between the flywheel and the motor. Alternately tighten the set screws until they are completely tight.

#### □ CARRIAGE WIRE

### Replace

Replace the wire if it is kinked, worn, or otherwise damaged (Figure 13, #5).

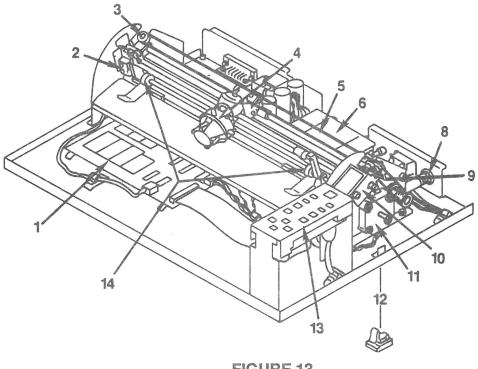


FIGURE 13

1. Cut or otherwise remove the old wire.

Note: Treat the new wire gently. It kinks easily.

2. Loosen but do not remove the nuts on the pulley motor and the mounting screw for the left pulley assembly (Figure 14, #3).

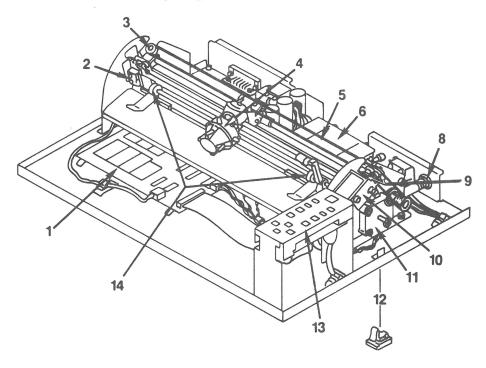


FIGURE 14

- 3. Loosen the retaining clamp screw on the pen carriage (Figure 14, #4).
- 4. Tear off a piece of tape and leave it easily accessible.

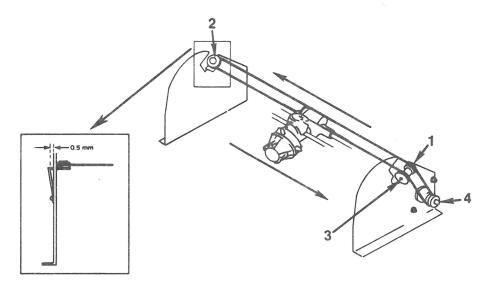


FIGURE 15

5. There are two slots in the motor pulley (Figure 15, #4). Insert one end of the carriage wire into the long slot (Figure 16) and slide it to the inside (center) of the pulley.

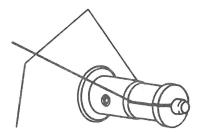


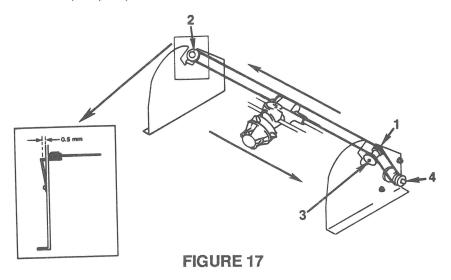
FIGURE 16

6. Keeping the wire taut, manually wind the wire onto the pulley by rotating the pulley clockwise nine revolutions.

**Note:** Make sure the loops of the wire do not overlap.

Once the wire is wound, hold it down with the tape.

7. Thread the wire around the guide pulleys, following the arrows, in numerical order as shown in Figure 17, #1, #2, and #3.



- 8. Place the tape on the motor pulley so that you can access the short slot of the pulley.
- 9. Slip the end of the carriage wire into the short slot of the motor pulley. (See Figure 18.) This should be a tight fit. If it isn't tight, give the pulley another revolution.

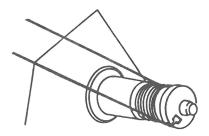


FIGURE 18

(If you have trouble slipping the wire into place, remove the wire from the left guide pulley, slide the wire end into place, and then pull the wire back onto the guide pulley.)

- 10. Tighten the mounting screw for the left guide pulley.
- 11. Adjust the wire tension (see steps in the following section).
- 12. Remove the tape from the pulley motor.
- 13. Turn the motor pulley until it has an equal number of turns on either side of where the carriage wire leaves the motor pulley.
- 14. Slide the pen carriage to approximately the middle of the carriage/bed assembly.
- 15. Place the carriage wire closest to you under the retaining clamp on the pen carriage. Tighten the retaining clamp screw.
- 16. Slide the pen carriage back and forth to check that it can reach both ends of the carriage/bed assembly.

**Note:** The right feed-roller should be to the far right.

If the pen carriage cannot reach both ends, loosen the retaining clamp on the carriage assembly, move the pen carriage in the direction that was difficult to reach, and then tighten the retaining clamp and try it again. Adjust
Carriage Wire
Tension

Read the following two paragraphs before proceeding with the numbered steps.

The carriage wire tension is adjusted by rotating the pulley motor.

The wire tension is correctly adjusted when the left pulley assembly (Figure 19, #3) is approximately 0.5 mm (1/48 inch) from the carriage/bed assembly when measured at the upper end of the left pulley assembly. (See insert, Figure 20.)

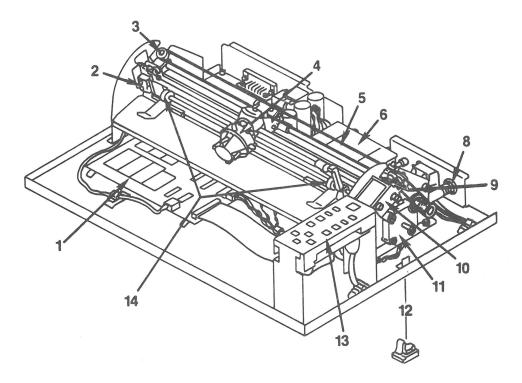
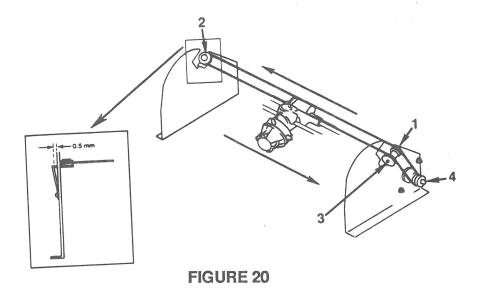


FIGURE 19



- 1. Loosen the nuts which attach the pulley motor to the carriage/bed assembly.
- 2. Adjust the carriage wire tension by rotating the motor while watching the gap at the upper end of the left pulley assembly. When the gap is approximately .5 mm (1/48 inch), tighten down the bolts.
- 3. Tighten the nuts when the pulley assembly is correctly adjusted.

**Note:** If you were replacing the carriage wire, return to step 12 of the Replace Carriage Wire section above and continue from there.

**Note:** If you were replacing the pulley motor, return to step 10 of Replace Pulley Motor and continue from there.

#### □ SOLENOID

# Remove and Replace

The solenoid moves the pen carriage up and down (Figure 21, #2).

- 1. To remove the solenoid, remove the two screws which attach it to the carriage/bed assembly.
- 2. Replace the solenoid by loosely tightening the solenoid screws, adjusting the solenoid, and then tightening down the screws.

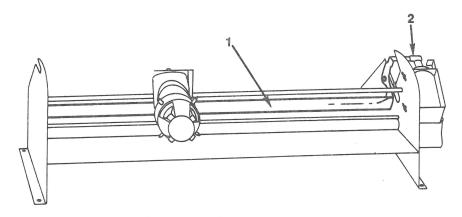


FIGURE 21

## Adjustment Procedure

Read the following paragraphs before doing the numbered steps.

The solenoid adjustment determines the pen height. In making this adjustment you are concerned with the solenoid, bail, bail lever, and pen carriage.

Look underneath the pen carriage to see where the bail (Figure 21, #1) comes into contact with the pen carriage. Push in bail lever to depress the cylinder on top of the solenoid (Figure 21, #2). Watch the bail move.

The gap between the bail and the pen carriage should be approximately 1 mm (measured when an uncapped pen is touching the platter and the solenoid cylinder is pushed in).

- 1. Put uncapped pens in pen carriage.
- 2. Loosen but do not remove the screws which attach the solenoid to the carriage/bed assembly.
- 3. Push in the solenoid cylinder by depressing the bail lever.
- 4. With the solenoid cylinder still depressed, guide the solenoid up and down to adjust the gap between the bail and pen carriage. Guide the solenoid up to lessen the gap.
- 5. When the gap is approximately 1 mm (1/24 inch) tighten the solenoid screws.

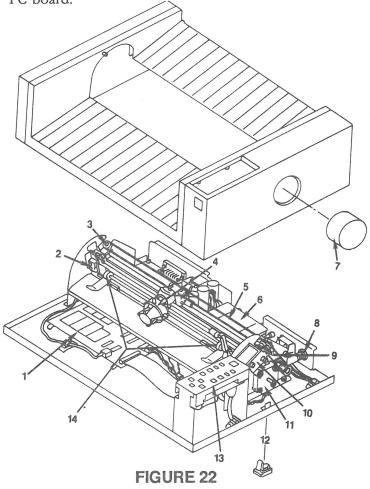
### ☐ HOME POSITION SWITCH ASSEMBLY

## Remove and Replace

- 1. Disconnect the home position switch connector (CN7) from the PC board (Figure 22, #2).
- 2. Remove the screw and washer which hold the switch bracket in place.
- 3. Replace the home position switch assembly and its screw.

**Note:** When installed, the switch and bracket should be parallel with the sides of the rectangular cut-out in the carriage/bed.

- 4. Feed wires back through circular hole in the left side of the carriage/bed assembly so that the connector comes out under the carriage/bed.
- 5. Connect the home position switch connector to the PC board.



### **PEN CARRIAGE ASSEMBLY**

#### Remove

To remove the pen carriage assembly (Figure 22, #4) you will have to remove the two bars to which it is attached. Turn the plotter so that it is facing you.

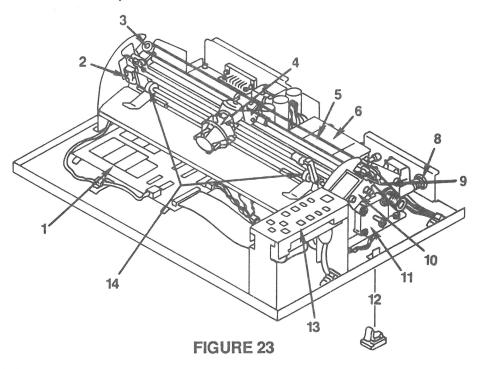
Rear Bar Removal

- 1. Remove the pens from the carriage.
- 2. Put tape around the wires on the motor pulley.
- 3. Loosen the wire-retaining-clamp screw of the pen carriage.
- 4. Remove the left pulley assembly (Figure 22, #3).
- 5. Remove the e-clip on the far right of the bar (outside of the carriage/bed) using needlenose pliers. Slide the bar out.

...Continued on next page

#### Front Bar Removal

6. Remove the screw and washer that holds in place the front bar (and the home position switch bracket [Figure 23, #2]). Pull this bar out. The pen carriage assembly is now free.



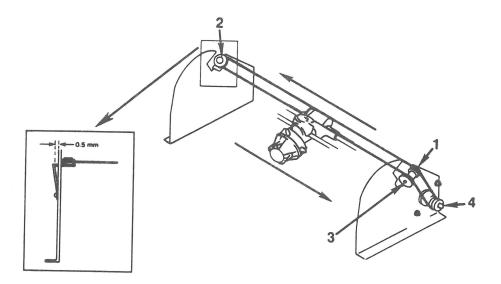
#### Replace

- 1. Replace the rear bar, threading it through the pen carriage. Replace the left guide pulley. Put the eclip in place.
- 2. Replace the forward bar, threading it through the pen carriage.
- 3. Replace the home position switch and tighten the screw.

**Note:** When installed, the switch and bracket are parallel with the rectangular cut-out in the carriage/bed.

4. Replace the left pulley assembly.

**Note:** When in place, the pulley should be inside the frame of the carriage assembly. (See Figure 24, insert.)



#### FIGURE 24

- 5. Put the carriage wire over the left pulley.
- 6. Put the carriage wire under the retaining clamp of the pen carriage and tighten the screw.
- 7. Check the guide pulleys (Figure 23, #3 and #9) and the motor pulley to see that the carriage wire is wound correctly.
- 8. Check the carriage wire tension.

## □ FUSE

# Remove and Replace

- 1. Use a flatblade screwdriver to turn fuse cover (Figure 23, #8) 1/4 turn to the left.
- 2. Put new fuse in cover and replace the cover.

#### ☐ BAIL SPRING

#### Remove

The bail is the rod that is moved by the solenoid (Figure 25, #1). The spring is on the far right side of the bail, inside the carriage/bed.

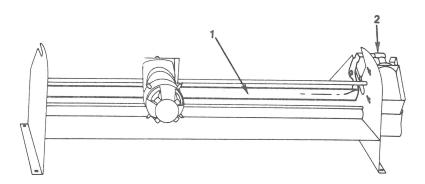
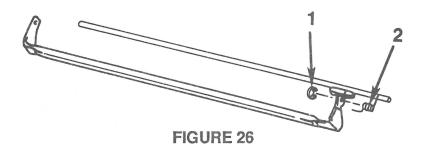


FIGURE 25

1. Remove the e-clip using needlenose pliers (Figure 26, #1).



2. Gently slide the bail to the left, up, and toward you so you can get at the spring.

**Note:** Be careful. The bail is flexible and you can easily bend it out of shape.

3. Remove the spring.

#### Replace

- 1. Put the spring back on the assembly. The right-angle side should be to the left.
- 2. Replace the bail and the e-clip.
- 3. The straight end of the spring should lie on top of the rear bar. (See Figure 26, #2.) The right-angled side should lie on top of the bail.

## **4** Apple Technical Procedures

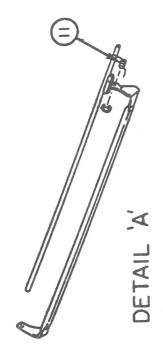
# **Apple Color Plotter**

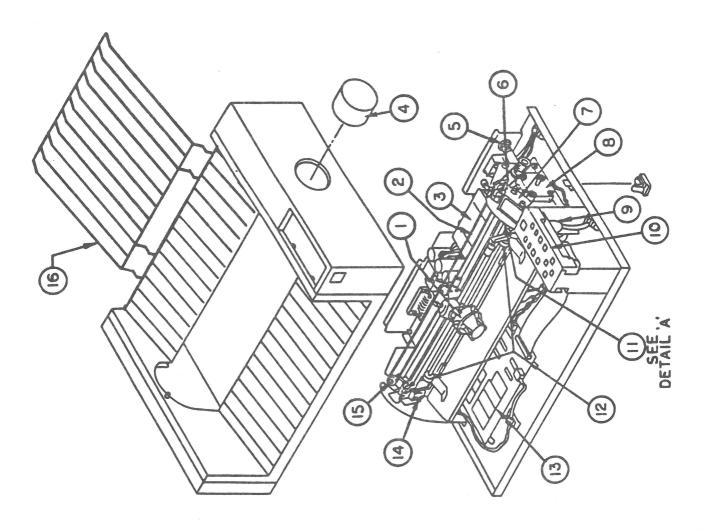
# Section 4 - Illustrated Parts List

#### **CONTENTS**

4.2 Color Plotter Assembly

The figures and lists in this section include all piece parts that can be purchased separately from Apple for the Color Plotter, along with their part numbers. These are the only parts available from Apple. Refer to your Apple Service Programs Manual for prices.





rev. Apr 85

Apple Color Plotter

## □ COLOR PLOTTER ASSEMBLY

<u>Item</u>	Part No.	<u>Description</u>						
1	970-0588	Pen/Carriage Assembly						
2	970-0587	String Assembly						
3	970-0583	Transformer						
4	970-0597	Knob/Clutch Assembly						
5	740-0203	Fuse						
6	970-0596	Right Pulley Assembly						
7	970-0589	Solenoid Assembly						
8	970-0590	Motor Assembly						
9	970-0586	AC Switch						
10	970-0585	Keyboard Assembly						
11	970-0593	Spring						
12	970-0591	Feed Roller						
13	661-95147	Color Plotter Main PCB						
14	970-0592	Home Switch Assembly						
15	970-0595	Left Pulley Assembly						
16	919-0059	Back Paper Support						

# **4** Apple Technical Procedures

# **Graphics Tablet**

# **Technical Procedures**

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	1.5 1.5	Inserting the Interface Card Attaching the Cables to the Back Panel
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Installation	2.6	Clamp Connecting the Internal Cables to the Connector Card
	2.7 2.7 2.8	Installing the Connector Clamp Inserting the Interface Card Connecting the Internal and External Cables
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Section 4 – Upgrading from Non-RFI to RFI	4.2 4.2 4.3	Introduction RFI Parts and Part Numbers Needed for the Upgrade Upgrading to RFI
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# **■ Apple Technical Procedures**

# **Graphics Tablet**

# Section 1 – Apple lle Installation

1.5

## **CONTENTS**

1.3	Introduction
1.3	Connecting the Internal Cables to the Interface
	Card
1.5	Inserting the Interface Card

Attaching the Cables to the Back Panel

#### □ INTRODUCTION

The new Graphics Tablet RFI is functionally identical to that of the NON-RFI Graphics Tablet, A2M0029. Minor changes have been made to meet EMI specifications required by the FCC.

#### **Materials Required**

Small flatblade screwdriver Two nut plates Four hexagonal-head screws

The small wrench that comes with the Graphics Tablet

**Note:** The large, gray-metal, two-piece connector clamp that comes with the interface card is not needed for Apple IIe installation. It is only used with earlier models of the Apple II.

## □ CONNECTING THE INTERNAL CABLES TO THE INTERFACE **CARD**

#### Procedure

1. Find the internal pen cable and one of the nut plates (see Figure 1). This cable has a "D"-shaped connector at one end and a small slip-on connector at the other end with four holes in it. Put the slipon connector through the nut plate, with the nuts facing away from the "D"-shaped connector.

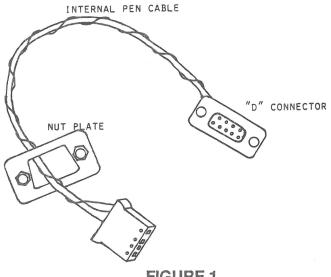
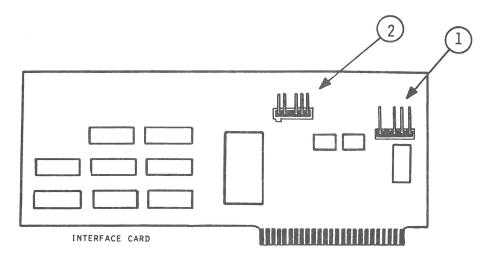


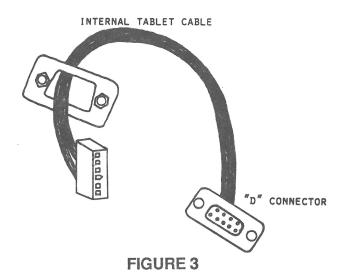
FIGURE 1

2. Locate a set of four pins near the top right edge of the interface card (see Figure 2, #1) and slide the slip-on connector onto the pins.



#### FIGURE 2

3. Now find the internal tablet cable and put its slipon connector through the nut plate, with the nuts facing away from the "D"-shaped connector (See Figure 3).



4. Slide this connector onto the second set of pins (see Figure 2,#2) on the interface card to the left of the first cable you connected.

### ☐ INSERTING THE INTERFACE CARD

#### Procedure

- 1. Unplug the power cord from the back of the computer.
- 2. Remove the cover of the Apple computer. You will install the interface board into one of the expansion slots at the back of the main board. The slots are numbered from 1 to 7 with slot 1 nearest to the power supply case. The interface card will work properly in any slot except slot 3. Slot 5 is a good choice because it's near the location where the "D" connectors will be installed on the back of the computer.
- 3. Insert the interface card into slot 5.

### ☐ ATTACHING THE CABLES TO THE BACK PANEL

#### Procedure

- 1. Now turn the computer around and look at the back panel. You'll see several numbered openings with rectangular plugs in them. Openings 5 and 6 will be used for the Graphics Tablet connectors (actually, any of the openings may be used as long as they are the same size). Remove the hole plugs in openings 5 and 6 by presssing down and out on the plastic tab on the back of each plug.
- 2. Slide the nut plate up the tablet internal cable until it's right up against the "D"-shaped connector. The tablet internal cable is the one connected closest to the middle of the interface card.
- 3. Next put the connector and nut plate up against the bottom opening in the back panel (opening 6). The connector should be in direct contact with the back panel, the nut plate should be directly behind the connector, and the part of the connector with the nine holes in it should be protruding through the opening.

- 4. Now insert the hexagonal-head screws from outside the computer through the notches above and below the opening in the back panel, then through the holes in theconnector, and finally through the holes in the nut plate. Tighten the screws with the wrench that came in the Graphics Tablet package.
- 5. Plug the cable from the Graphics Tablet into the internal cable connector. Finish the connection by tightening the two screws.
- 6. Now attach the internal pen cable to opening 5 on the back panel.
- 7. Next plug the external pen cable into the internal pen connector. Tighten the two screws.
- 8. Double-check all of the connections you've made, using this list:
  - the internal tablet cable is attached to the external tablet cable
  - the internal pen cable is attached to the external pen cable
  - the interface card is firmly seated
  - the "D"-shaped connectors are firmly plugged in and the screws are tightened down
- 9. Put the cover back on the computer.

# **★** Apple Technical Procedures

# **Graphics Tablet**

# Section 2 – Apple II or II Plus Installation

## □ CONTENTS

2.3	Introduction
2.3	Attaching the Internal Cables to the Connector
	Clamp
2.6	Connecting the Internal Cables to the Connector
	Card
2.7	Installing the Connector Clamp
2.7	Inserting the Interface Card
2.8	Connecting the Internal and External Cables

#### □ INTRODUCTION

The new Graphics Tablet is functionally identical to the non-RFI Graphics Tablet, A2M0029. Minor changes have been made to meet the EMI specifications required by the FCC.

#### **Materials Required**

The large, gray-metal, two-piece clamp that comes with the Graphics Tablet

Two nut plates

Two Phillips-head screws Four hexagonal-head screws

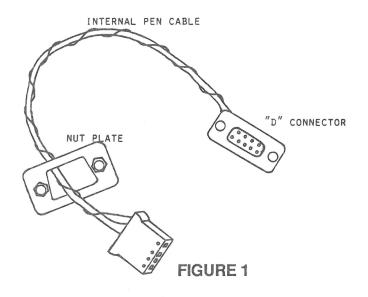
The small wrench that comes with the Graphics Tablet

Small Phillips screwdriver Small flat blade screwdriver

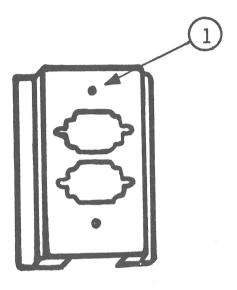
# ☐ ATTACHING THE INTERNAL CABLES TO THE CONNECTOR CLAMP

#### Procedure

1. Find the internal pen cable and one of the nut plates (See Figure 1). This cable has a "D"-shaped connector at one end and a small slip-on connector at the other end with four holes in it. Put the slip-on connector through the nut plate, with the nuts facing away from the "D"-shaped connector.



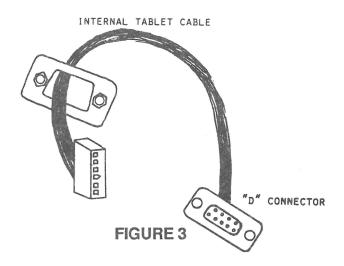
2. Find the front piece of the two-piece connector clamp (See Figure 2). The top is the end where the screw hole is nearer the edge (see Figure 2,#1). Put the "D"-shaped connector and nut plate right up against the top opening. The connector should be in direct contact with the clamp, the nut plate should be directly behind the connector, and the part of the connector with the nine small holes in it should be protruding through the opening in the clamp.



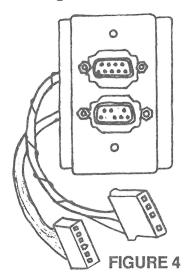
#### FIGURE 2

3. Attach the connector and the nut plate to the clamp by putting the hexagonal-head screws through the front of the clamp, then through the holes in the "D"-shaped connector, and finally through the nut plate. Tighten down the screws with the small wrench that came with the Graphics Tablet.

4. Now find the internal tablet cable (see Figure 3). It has a slip-on connector with six small holes on one end. Slide the slip-on connector through the other nut plate, making sure that that the nuts are facing away from the "D"-shaped connector.



5. Attach the connector and nut plate, as you did in steps 2 and 3, to the bottom opening of the connector clamp. The assembled connectors are shown in Figure 4.

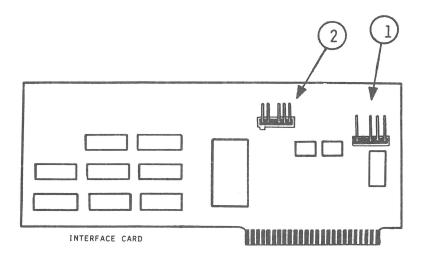


6. Now that the connectors are attached to the front of the clamp, fit the two clamp pieces together to form a "box" and put the two internal cables through the side opening on the back of the clamp. Make sure the screw holes line up. Attach the two clamp pieces with two Phillips head screws. Don't tighten the screws completely yet.

# □ CONNECTINGTHE INTERNAL CABLES TO THE INTERFACE CARD

#### **Procedure**

- 1. The internal pen cable should now be attached to the top cutout in the connector clamp. Check to see that the small slip-on connector at the end has four holes.
- 2. Locate a set of four pins near the top right edge of the interface card (see Figure 5, #1) and gently slide the slip-on connector onto the pins.



#### FIGURE 5

- 3. Now find the Graphics Tablet internal cable. It should be attached to the bottom cutout on the front of the connector clamp.
- 4. Slide the end with the slip-on connector onto the second set of pins (see Figure 5,#2) on the interface card to the left of the first cable you connected.

#### □ INSTALLINGTHE CONNECTOR CLAMP

#### Procedure

- 1. Unplug the power cord from the back of the computer and remove the cover.
- 2. Look at the back panel of the computer. The connector clamp will be installed into one of the three deep vertical notches. Take the connector clamp and slide it down as far as it will go into one of the notches. If you have trouble sliding the connector down into the notch, loosen the two Phillips head screws and then push it down into the slot. Now tighten the screws that hold the clamp assembly together until the clamp can no longer be moved in the opening.

#### □ INSERTING THE INTERFACE CARD

#### Procedure

 You will install the interface card in one of the expansion slots. The slots are numbered from 0 to 7 with slot 0 nearest to the power supply. The interface card will work properly in any slot except slot 0. Insert the interface card into a slot near the connector clamp.

## □ CONNECTINGTHE INTERNAL AND EXTERNAL CABLES

#### Procedure

- 1. Now find the cable attached to the Graphics Tablet pen and plug it into the top connector. Complete the connection by tightening the screws on the external pen connector.
- 2. Plug the connector on the cable attached to the Graphics Tablet into the bottom connector. Complete the connection by tightening the screws on the external tablet connector.
- 3. Double-check all of the connections you've made, using this list:
  - the internal tablet cable is attached to the external tablet cable
  - the internal pen cable is attached to the external pen cable
  - the interface card is firmly seated
  - the "D"-shaped connectors are firmly plugged in and the screws are tightened down
- 4. Put the cover back on the computer.

# **★** Apple Technical Procedures

# **Graphics Tablets**

# Section 3 - Troubleshooting

### **CONTENTS**

3.3	Crimatam	Table
5.5	Symptom	Table

- 3.4 Pen Alignment
- 3.5 Checking the Tablet

#### □ SYMPTOM TABLE

**CAUTION:** Diskettes and video tapes can be erased by the magnetism of the Graphics Tablet or biasing magnet. Do not store diskettes of video cassettes on or near the Graphics Tablet or biasing magnet.

#### **Symptom**

#### Cure

- Monitor displays "not detecting interface card"
- 1. Check interface card firmly seated
- 2. Clean card contacts ("fingers")
- 3. Replace interface card..
- Unable to draw or select menu commands with the pen
- Swap the following components in this order:
  - Interface card
  - Pen
  - Internal pen cable
  - Internal tablet cable
  - Graphics tablet
- Apple Ile "beeps" when typing graphics tablet commands
- Press the "CAPS LOCK" key and retype the command. Apple IIe will not accept lower case commands with the Graphics Tablet software.
- Erratic drawing: extra or missing dots
- 1. Wipe the tablet surface and the menu with the anti-static cloth

**CAUTION:** When using the biasing magnet, keep the magnet away from diskettes and video tapes. A magnetic field can erase information.

- 2. With power off, draw the biasing magnet across the surface using a slow continuous motion in a single direction. Do this for each direction; left to right, top to bottom, and diagonally.
- 3. Boot the Graphics Tablet Software diskette.
- 4. Select MENU ALIGNMENT and follow the instructions on the monitor.

**Note:** If the tablet does not pass the MENU ALIGNMENT procedure, perform the following procedure, PEN ALIGNMENT.

#### **DPEN ALIGNMENT**

#### **Materials Required**

Apple II Products Diagnostic Diskette (P/N 077-0100) Pen alignment block Nylon coil adjustment tool Sheet of 1/8" plexiglass Anti-static cloth

#### Procedure

- 1. Boot the Apple II Products Diagnostic diskette.
- 2. Select CARD TESTS and after that GRAPHICS TABLET TEST.

**Note:** To avoid confusion follow the instructions given here rather than the instructions displayed on the screen, as they sometimes refer to things you should do <u>after</u> you have pressed <ESC> to proceed to the next screen.

- 3. Press <ESC> and wait for the ROM test. If the ROM test fails, replace the interface card.
- 4. Press <ESC>.
- 5. Place the pen in the wooden alignment block.
- Place the alignment block so that the pen is between the eighth and ninth lines (counting the top border of the graph as line 1) in the column called "dots".
- 7. Press <ESC> twice.
- 8. Insert the nylon coil adjustment tool into the top of L2 (upper left corner of the interface card), and turn the slug counterclockwise until it is even with the top of the sleeve; then turn it clockwise until the crosshairs stabilize in the middle box. Continue to turn until they disappear again.
- 9. Now turn it counterclockwise again until the crosshairs first stabilize within the middle box.
- 10. Look straight down on the top of the tool and notice what direction the blade is pointing in.
- 11. Now continue to turn the tool counterclockwise.

- 12. When the crosshairs lose stability and jump out of the box, restabilize them; then look at the top of the tool and note which direction the blade points.
- 13. The correct setting is halfway between the two points at which the crosshairs stabilize.

#### □ CHECKING THE TABLET

With the surface biased, the menu aligned, and the pen aligned, you must check the tablet to see if there are any troubles that have not been corrected.

#### Procedure

- 1. Press <ESC> three times.
- 2. Wipe both sides of the sheet of 1/8" plexiglass with the anti-static cloth.
- 3. Place the plexiglass over the menu and with a straight edge (don't use metal), draw lines around the edges, through the middle, and diagonally. There should be no gaps, double lines, "glitches", or extraneous dots. If there are, repair the biasing procedures, and wipe the surfaces with the antistatic cloth.
- 4. If there are still missing or extra dots, the unit should be sent to Apple.

# **4** Apple Technical Procedures

# **Graphics Tablet**

# Section 4 - RFI Upgrade

## □ CONTENTS

- 4.2 Introduction
- 4.2 RFI Parts and Part Numbers Needed for the Upgrade
- 4.3 Upgrading to RFI

### □ INTRODUCTION

When a non-RFI Graphics Tablet is brought in for repair, you can either service it using the non-RFI parts that you have in stock or replace non-RFI modules/parts with their RFI counterparts. This section tells you what parts you will need and what to do to upgrade from a non-RFI Graphics Tablet to an RFI version.

## ☐ RFI PARTS AND PART NUMBERS NEEDED FOR THE UPGRADE

You will need the following RFI parts to do the upgrade:

661-91140	Graphics Tablet Assy-RFI
661-91141	Graphics Tablet Interface Card-RFI
661-91142	Graphics Tablet Stylus RFI
590-0085	Cable Assy Tablet, Internal
590-0102	Cable Assy Stylus, Internal
600-8010	Assy, Installation Hardware (A IIe)
805-0085	Clamp, Rear Peripheral Int. Conn.
	(A II/II+)
805-0105	Clamp, Front (A II/II+)

### □ UPGRADING TO RFI

Refer to Figure 1, which shows the configuration for the RFI and non-RFI versions of the Graphics Tablet. Notice that the only difference for the RFI configuration is that the tablet and the pen do not connect directly to the Interface Card. Instead, they connect to a short cable, and the cable connects to the Interface Card.

**Note:** Graphics Tablet installation procedures for the Apple IIe are given in **Section 1**, of the **Graphics Tablet Technical Procedures. Section 2** gives the installation procedures for the Apple II and II Plus.

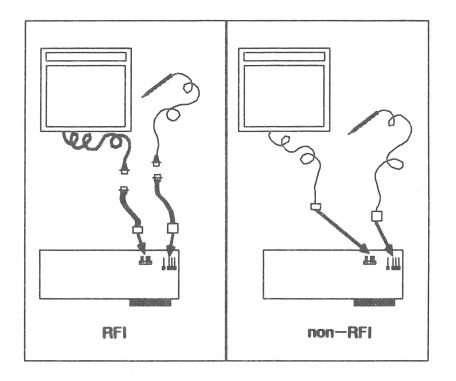


FIGURE 1

Graphics Tablet rev. Aug 84 RFI Upgrade / 4.3

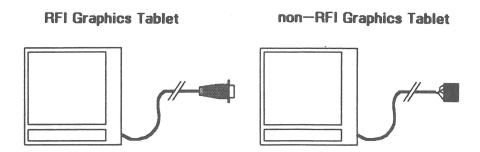
#### Procedure

1. Connect the RFI Graphics Tablet (see Figure 2) to the short cable with the colored plastic connector. Connect the other end of the short cable to the five-pronged connector on the RFI Interface Card. (See Figure 1.)

**Note:** The RFI Interface Card has a different R1 resistor value than the non-RFI version.

RFI R1 = 75 Ohm-5% (purple-green-black-gold)

Non-RFI R1 = 470 Ohm-5% (Yellow-purple-brown-gold)



#### FIGURE 2

The RFI version also has a capacitor on the noncomponent side of the card. (See Figure 3.)

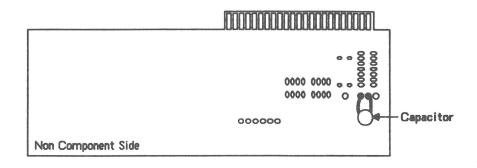
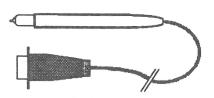


FIGURE 3

- 2. Connect the RFI Pen (see Figure 4) to the short cable with the white plastic connector. Connect the other end of the short cable to the four-pronged connector on the RFI Interface Card. (See Figure 1.)
- 3. If there is a non-RFI Interface Card in the computer, remove it and then insert the RFI Interface Card into slot 4 of the computer.

RFI Pen





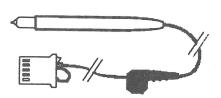


FIGURE 4

## **Apple Technical Procedures**

# **Graphics Tablet**

## Section 5 - Illustrated Parts List

### **CONTENTS**

5.1 Graphics Tablet, RFI-Non RFI Assembly (Figure 1)

The figures and lists in this section include all piece parts that can be purchased separately from Apple for the Graphics Tablet, along with their part numbers. These are the only parts available from Apple. Refer to your *Apple Service Programs Manual* for prices.

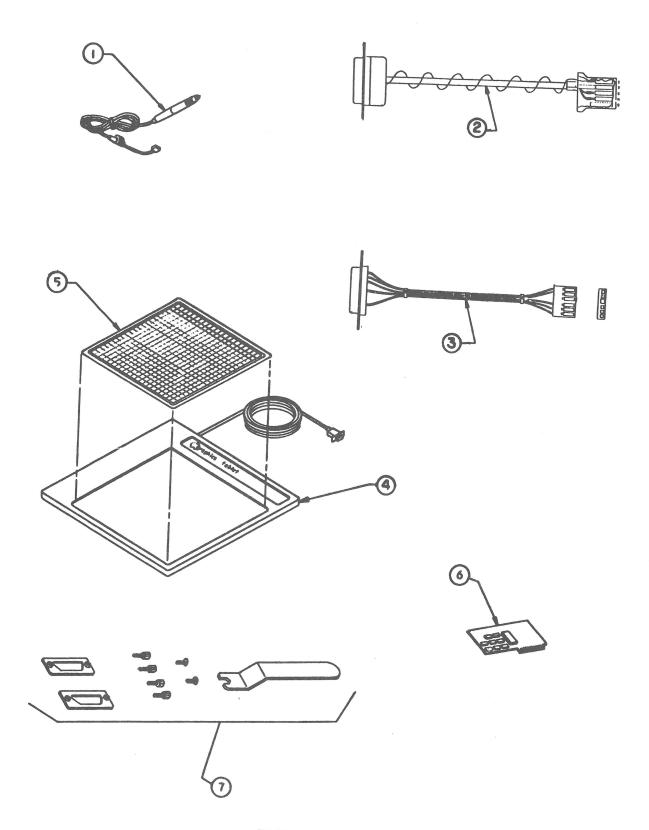


FIGURE 1

# ☐ GRAPHICS TABLET, RFI-NON RFI ASSEMBLY (Figure 1)

Item	Part No.	Description
1	661-91142	Graphics Tablet Stylus RFI
2	590-0102	Cable Assy Stylus, Internal
3	590-0085	Cable Assy Tablet, Internal
4	661-91140	Graphics Tablet Assy-RFI
5	825-0039	Overlay Apple Graphics Tablet
6	661-91141	Graphics Tablet Interface Card-RFI
7	600-8010	Assy, Installation Hardware (A IIe)
8	805-0085	Clamp, Rear Peripheral Int. Conn. (AII, AII+)
9	805-0105	Clamp, Front (AII, AII+)

## NUMERIC KEYPAD TECHNICAL PROCEDURES TABLE OF CONTENTS

# Section 1 - Troubleshooting & Assembly/Disassembly B. Assembly/Disassembly Section 2 - Illustrated Parts Appendix A.

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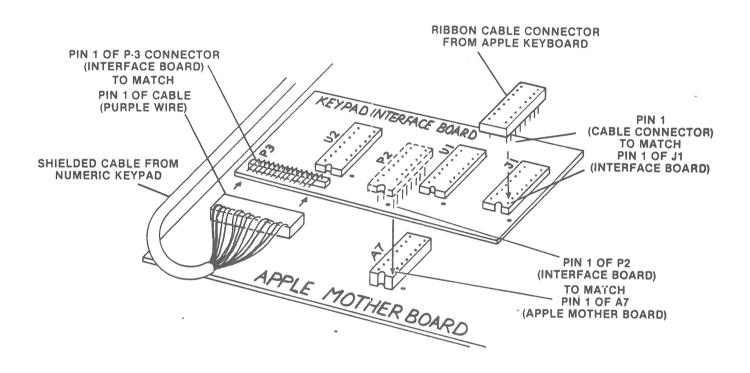
## Numeric Keypad Technical Procedures

#### Section 1

### Troubleshooting Assembly/Disassembly

#### Contents:

Α.	Troubleshooting	Guide.				 	 	 1.3
В.	Assembly/Disasse	∍mbly						
	Disconnecting	Keypad.				 	 	 1.5
	Swapping the (	Cable &	Keypad	Asser	mbly.	 	 	 1.5
	Reconnecting R	Kevpad.				 	 	 1.9



### FIGURE

#### A. TROUBLESHOOTING GUIDE FOR THE NUMERIC KEYPAD

NOTE: The special function keys (arrows, return, etc.) on the Numeric Keypad do not work properly when used with an Apple IIe containing a "revision C" character generator ROM. The Revision C ROM (part number 342-0132-C) was first shipped in the Apple IIe after 8/25/84. If you encounter difficulties with the function keys on the Keypad, check to see if the Apple IIe logic board contains the "revision C" ROM at location E-12. If it does REPLACE THE CHARACTER GENERATOR ROM with any other version from service stock (for example; part numbers 342-0132-A or 342-0132-B). DO NOT REPLACE THE ENTIRE APPLE IIE LOGIC BOARD.

1. Confirm that the keypad is malfunctioning by running keyboard test of Dealer Diagnostic diskette.

When you have isolated the malfunction to the Numeric Keypad, determine the failed component by performing the following steps:

- 2. Complete steps la. through li. of ASSEMBLY/DISASSEMBLY INSTRUCTIONS (on following pages) to gain access to and remove the keypad interface board.
- 3. Swap the interface board with a known good unit (from spares kit), reconnecting pins and cables as shown in Figure A.
- 4. Test the keypad using the Dealer Diagnostic diskette keyboard test. If the pad now works, reassemble the Apple II. If the pad doesn't work, put the old interface board back in and go to the next step.
- 5. Swap the cable, following steps 1j and 2 to 12 of the Assembly/Disassembly instructions. (see reminder below)
- 6. Test the keypad using the Dealer Diagnostic diskette keyboard test. If the pad now works, reassemble the Apple II. If the pad doesn't work, remove the new cable and use the old cable in the next step.
- 7. Swap the keypad assembly following steps 7 to 12 of the Assembly/Disassembly instructions. (see reminder below)
- 8. Test the keypad using the Dealer Diagnostic diskette keyboard test. If the pad now works, reassemble it and the Apple II (steps 13 to 15 of the Assembly/Disassembly intructions). The pad SHOULD work. If it doesn't, you have defective exchange modules. Find new exchange modules and start from step 3 above.

REMINDER: Before swapping ANY unit on the Numeric Keypad, POWER DOWN THE SYSTEM AND REMOVE THE POWER CORD FROM THE APPLE.

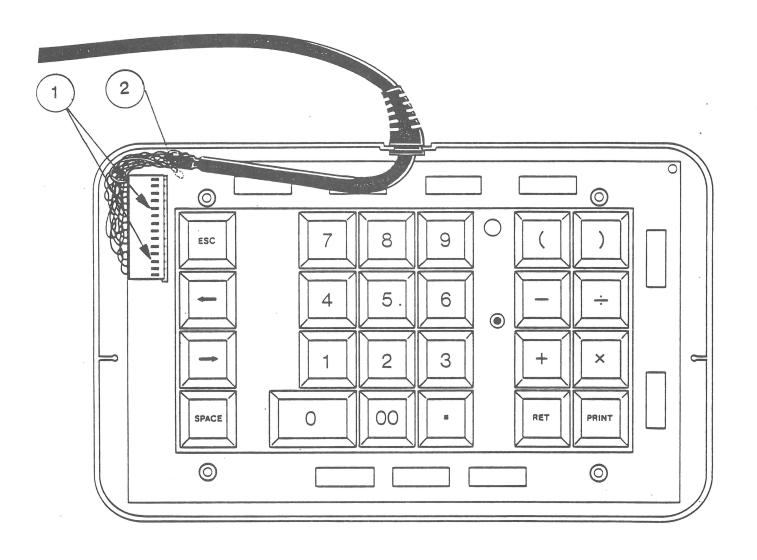


FIGURE D

- 4. Remove the 2 screws that are under the rubber feet you just removed.
- 5. Holding the case top to the bottom, turn the pad back over.
- 6. Remove case top by lifting off.
- 7. If you are replacing the CABLE ONLY, skip this step. Get the exchange keypad assembly from spares kit and set it next to the customer's keypad assembly. Pry off the key caps ONE AT A TIME, placing the cap from the customer's pad on to the new pad at the same location.
- 8. Note how the cable is laid and how it exits the case as shown in Figure D. Lift out customer's pad and place on normal soldering surface. (This step might not be applicable in swapping the keypad assembly.)
- 9. Carefully unplug the cable connector noting that the grooves of the cable connector are face up (see Figure D, #1).
- 10. Use a soldering iron to unsolder the grounding wire that is attached to the upper left side of the pad (see Figure D, #2)..
- 11. Get the appropriate cable (new one if you are replacing the cable, old one if this is a keypad swap) and plug it into the appropriate keypad assembly (old pad if this is a "cable only" swap, new pad if you are replacing the customer's pad). Note that the grooves of the cable connector are face up (see Figure D, #1).
- 12. Solder the ground wire to the designated area at the upper left side of the pad (see Figure D, #2).

STOP HERE! If you are CABLE SWAPPING, return to step 6 of the Troubleshooting Guide. If you are SWAPPING THE KEYPAD ASSEMBLY, return to step 8 of the Troubleshooting Guide. Do NOT reassemble keypad at this point.

- 13. When reassembling keypad, be sure the cable is laid correctly in the case bottom and that it points down as it exits the case as shown in Figure D. Be careful that all wires are set INSIDE the bottom of the case so none get pinched when the top is secured in place.
- 14. Replace case top. Turn pad over and replace 4 screws and LOWER rubber feet.

CONTINUE on page following illustrations.

### Numeric Keypad Technical Procedures

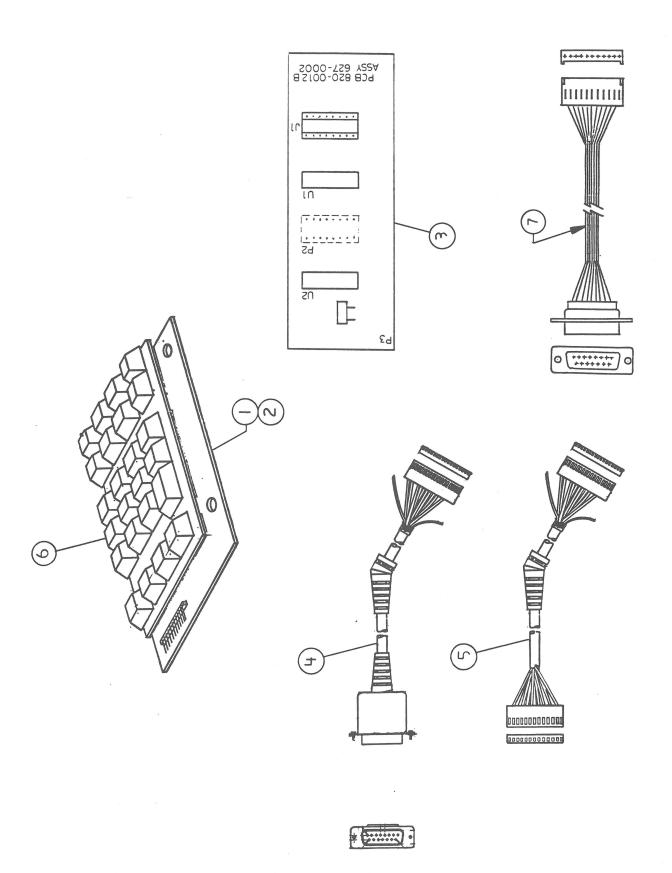
### Section 2

# Numeric Keypad Apple II/IIe Illustrated Parts List

The f	igures	and	lists	below i	inc]	lude a	all pi	ece	parts	that	can
be pu	rchase	ed sep	aratel	y from	App	ole fo	or the	Nun	neric	Кеурас	Ι,
along	with	their	part	numbers	5 .	These	e are	the	only	parts	
avail	able f	rom A	pple.	Refer	to	your	Apple	Ser	cvice	Progra	ams
manua	1 for	price	S.								

#### Contents:

AT	T/ a · · · a a a	77-	TT/TTO	2	2
Numeric	Kevbau	ADDIE	11/110.	 	. l.



# □ NUMERIC KEYPAD APPLE II/IIe (Figure 1)

<u>Item</u>	Part No.	<u>Description</u>
1	661-0314	Numeric Keypad Assembly, II, with cable
2	658-4040	Numeric Keypad Assembly, IIe
3	658-0005	Assy, PCB, Interface Keypad II
4	590-0130	Cable, Numeric Keypad IIe
5	590-0119	Cable, Numeric Keypad II
6	658-7008	Keycap Set, Numeric Keypad II
	658-7044	Keycap Set, Numeric Keypad IIe (Replaced by 658-4040)
7	590-0129	Interconnect Cable, Numeric Keypad IIe

The following keyswitches are illustrated in Appendix A:

705-0070	Alps	Long-Stem	Keyswitch
705-0075	SMK	Short-Stem	Keyswitch

**Note:** The parts list for the Macintosh Numeric Keypad can be found in the Illustrated Parts List section of the *Macintosh/Macintosh Plus Technical Procedures*.

# Numeric Keypad Technical Procedures Appendix A

### Keyboard and Keyswitch Identification

Apple Computer makes three types of numeric keypads, one each for the Apple II, IIe, and Macintosh. To identify the keyswitches used with these keypads, refer to Figure 1 below.

Some of the keyswitches are used on more than one numeric keypad: For example Alps long stem is used on both the Apple IIe and Macintosh Numeric Keypads.

The procedure to replace a keyswitch is in Section 3 of You Oughta Know.... For information about Macintosh Numeric Keypads, go to the Macintosh section of the Technical Procedures Binder.

FIGURE 1: Keyswitch	Keyboards
A. Apple II Numeric Keypad  705-0075 SMK Short Stem Keyswitch	Apple II Keypad Service Number: 661—95092
B. Apple Ile Numeric Keypad  705-0070  Alps Long Stem  Short Stem  Keyswitch  ("Extended")	Apple lle Keypad Service Number: 658-4040
C. Macintosh Numeric Keypad  705-0070  Alps Long Stem  ("Extended")	Macintosh Keypad Service Number: 658–4045

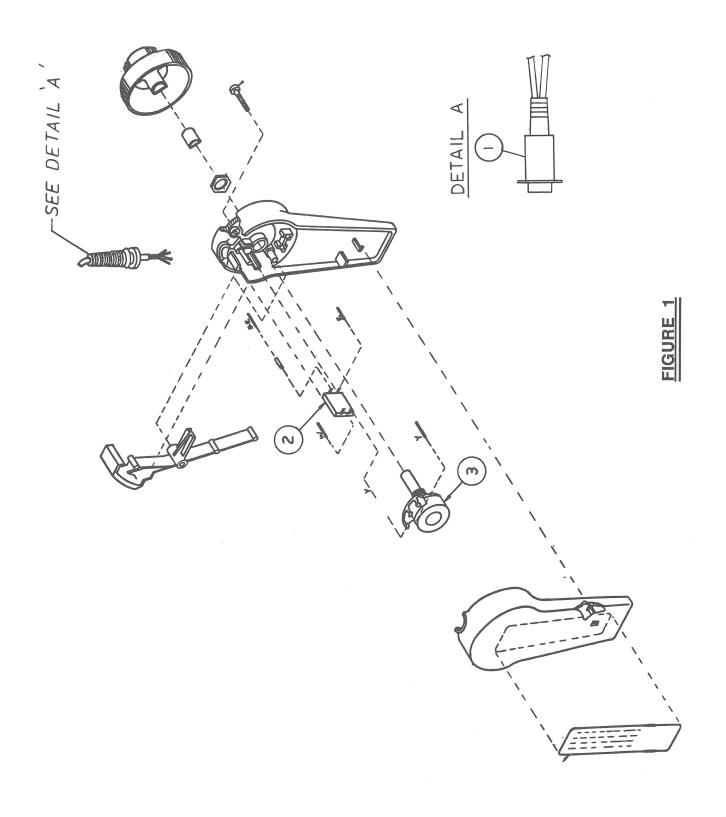
#### MISCELLANEOUS ILLUSTRATED PARTS

#### TABLE OF CONTENTS

The figures and lists which follow include some miscellaneous piece parts that can be purchased separately from Apple, along with their part numbers. Refer to your Apple Service Programs manual for prices.

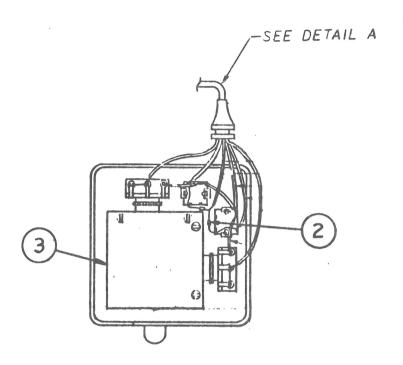
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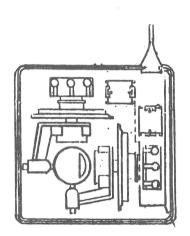
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Joyst	ick	Assembly	y .				0	 				 	•		0				0	 			 1	. /	4

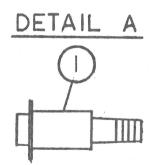


# HAND CONTROLLER - (Figure 1)

Item	Part No.	Description
1	590-0132	Cable, Hand Controllers, IIe
2	705-0072	Hand Controller, Pushbutton Switch
3	109-0430	Hand Controller, Potentiometer







# FIGURE 2

# JOYSTICK ASSEMBLY (Figure 2)

Item	Part No.	Description
1	661-95133 590-0187 590-0560	Joystick, IIe-IIc, Platinum Joystick Cable, IIe-IIc, Beige Joystick Cable, IIe-IIc, Smoke
2 3	101-4271 699-0097	Joystick Resistor, 270 ohm Joystick Gimbal Assembly